JULY 1960

EPOXIDATION BEARS WATCHING

High site reactivity opens doors to new resins, plasticizers, intermediates — page 28

A CONTINUOUS $Ca(OCl)_2$ FIRST

Lime/chlorine reaction controlled from oxidation-reduction potential — page 108

CHEMICAL PROCESSING

— PROCESS DYNAMICS

NACE president GEORGE E. BEST:

'Untie the corrosion engineer's hands for some REAL savings!'

Today's Plants Demand Top Corrosion Management

. . . page 27

Helps for fighting . . .

CORROSION

Index to 38-page section of latest tools, techniques, literature, data . . . page 49

A REINHOLD PUBLICATION "Executive Magazines for Industry"

PROBLEM: An effective solid catalyst was sought for the alkylation of isobutane with ethylene to produce diisopropyl, a high octane gasoline component valuable for its high lead susceptibility and excellent volatility.

SOLUTION: Use of BF_3 with certain hydrated salts produces active alkylation catalysts which bypass many problems encountered with known catalysts. These new catalysts can be used at low temperatures—thus avoiding undesirable side reactions and mixing problems due to changes in viscosity.

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Check 3014 opposite last page.

conventions and exhibits

Aug. 8-9. Third Annual Rocky Mountain Spectroscopy Conference, Rocky Mountain Spectroscopy Section of the Society for Applied Spectroscopy, Denver, Colo.

Aug. 10-12. Ninth Annual Denver Research Institute Metallurgy Division's X-ray Conference, Denver, Colo.

Aug. 14-17. American Institute of Chemical Engineers, 4th National Heat Transfer Conference, Statler Hotel, Buffalo, New York.

Aug. 23-25. Cryogenic Engineering Conference, University of Colorado, Boulder, Colo.

Sept. 6-16. The Production Engineering Show, Navy Pier, Chicago, Ill.

Sept. 11-16. American Chemical Society. 138th National Meeting. New York.

Sept. 13-15. A new chemical show, Chemical Exposition U.S.A., will be held—for the first time—at the Statler Hilton Hotel in New York City. It will be held concurrently with the 138th National Meeting of the American Chemical Society. Exposition will be sponsored by the New York Section of the ACS. Emphasis at exposition will be on the basic chemical companies, with the addition of instrument and laboratory firms.

Sept. 25-28. American Institute of Chemical Engineers, Mayo Hotel, Tulsa, Okla.

Sept. 26-30. Instrument Society of America, Instrument-Automation Conference and Exhibit, Coliseum, N.Y.

Oct. 9-13. The Electrochemical Society, Meeting, Shamrock Hotel, Houston, Texas.

Oct. 12-13-14. Combined meeting of the Fourth Conference on Analytical Chemistry in Nuclear Reactor Technology and the First Conference on Nuclear Reactor Chemistry, Gatlinburg, Tenn.

Oct. 17-18. American Coke and Coal Chemicals Institute, Annual Meeting,

Greenbrier, White Sulphur Springs, West Virginia.

Oct. 17-19. Technical Association of the Pulp and Paper Industry, Plastics-Paper Conference, Hotel Syracuse, Syracuse, New York.

Oct. 17-19. Fall Meeting of the American Oil Chemists' Society, Hotel New Yorker, New York City.

Oct. 17-21. 42nd National Metal Exposition & Congress, American Society for Metals, Trade and Convention Center, Philadelphia, Pennsylvania.

Oct. 29-*Nov.* 2. 25th Paint Industries Show, Chicago, Ill.

Oct. 30-*Nov.* 2. Federation of Societies for Paint Technology, 38th Annual Meeting, Sherman Hotel, Chicago, Ill.

Oct. 31-*Nov.* 2. The 22nd Annual National Packaging Forum, Packaging Institute, Statler-Hilton Hotel, New York City.

Nov. 8-10. American Material Handling Society, Meeting, in conjunction with Material Handling Institute's Central States Show, Kentucky Fair and Exposition Center, Louisville, Ky.

Nov. 9-10. Chemical Market Research Association, Pittsburgh Hilton Hotel, Pittsburgh, Pa.

Nov. 28-*Dec.* 2. The 24th National Exposition of Power & Mechanical Engineering, New York Coliseum, N.Y.

Dec. 3-9. Chemical Specialties Manufacturers Association, 47th Annual Meeting, Hollywood Beach Hotel, Hollywood, Fla.

Dec. 4-7. American Institute of Chemical Engineers, Statler Hotel, Washington, D.C.

Dec. 8. Annual Meeting of the Synthetic Organic Chemical Manufacturers Association, Hotel Roosevelt, New York.

Dec. 11-14. American Nuclear Society, Meeting, Mark Hopkins Hotel, San Francisco, Calif.

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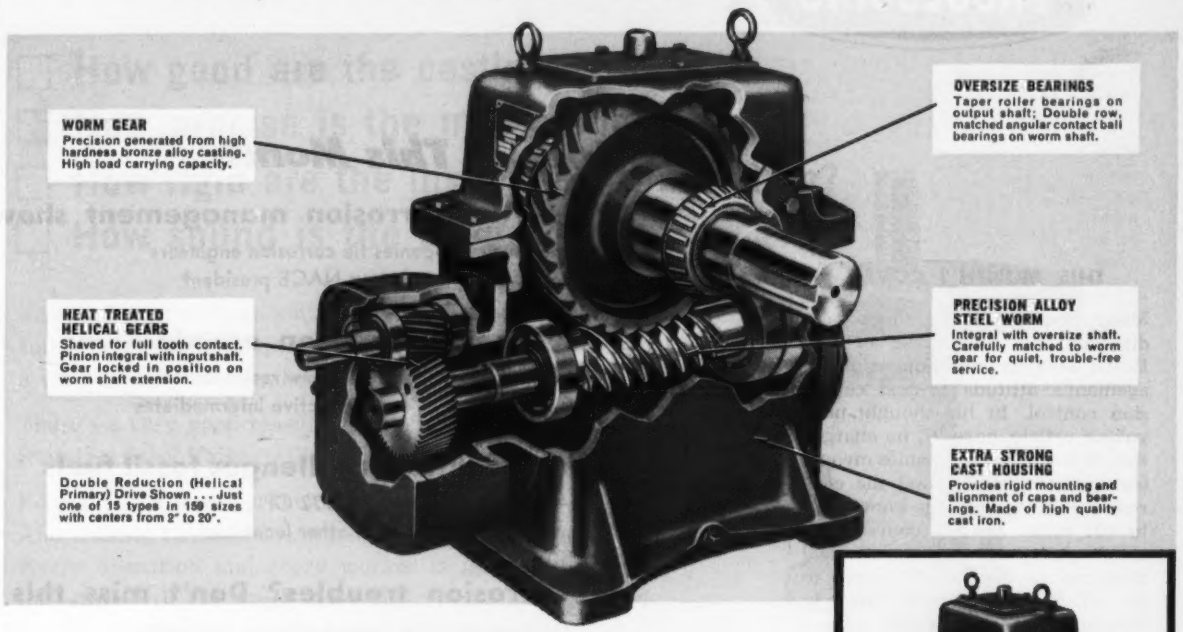
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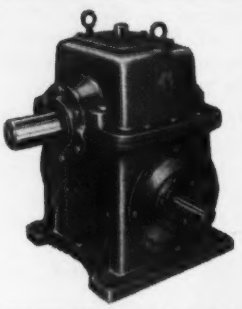

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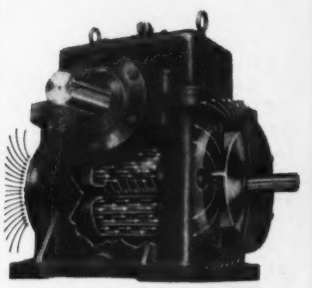

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CHEMICAL PROCESSING HIGHLIGHTS

JULY 1960

VOLUME 23 • NUMBER 7

Special This Month

27 Is your corrosion management showing?
Too many companies tie corrosion engineers' hands at high cost, says NACE president

28 Keep your eye on epoxidation!
Versatile technique builds new resins, better PVC plasticizers, more effective intermediates

30 Nuclear heat challenges fossil fuels
Already competitive for 172 CPI plants in U.S.; may soon gain edge in other locations

49 Corrosion troubles? Don't miss this . . .
Thirty-eight pages packed with a cross-section of problems . . . and solutions; new coatings, inhibitors, materials, equipment; current literature and technical paper reviews

87 Metal acetylacetonates — fertile fields to plow
Catalysis and polymer building two of many uses ahead for versatile family of compounds

108 New wrinkle removes $Ca(OCl)_2$ production kinks
Lime/chlorine reaction paced by oxidation-reduction potential in continuous, fully automatic system

THIS MONTH'S COVER

Many of you will be shocked to discover that the cause of Mr. Best's obvious agitation is management's attitude toward corrosion control. In his thought-provoking article, page 27, he charges that in too many companies myopic management isn't letting the corrosion engineer use his know-how to cut costs. But, of course, you aren't guilty of such paradoxical thinking . . . so YOU'LL want to tip off YOUR corrosion man to this issue's feature on the subject (see page 49).

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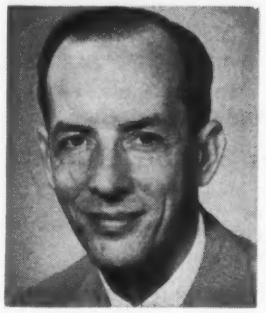

More Controversial Articles Coming

Perhaps you have noticed in recent issues of CP that we have struck out strongly on some of the controversial topics of interest to chemical management today.

For example, in this issue George E. Best, dynamic new president of the National Association of Corrosion Engineers, notes that management of corrosion is lacking and suggests steps to correct it.

In June CP, an article was carried on the forward-looking engineering employment practices of Phillips Petroleum Company, which are aimed directly at the major causes of dissatisfaction among engineers.

Widespread comment is being obtained on the article in May suggesting that a stronger stand should be made by the chemical industry in combating the malicious information about chemicals in foods and other products.

More articles on controversial management subjects of this type will be coming up since we are convinced that the entire management team will be interested in these topics.

General-industry, controversial and technological progress articles will continue to be the main editorial diet of CHEMICAL PROCESSING — to keep the reader abreast of "what's going on."

Gordon Weyermuller

Petrochemical Editor

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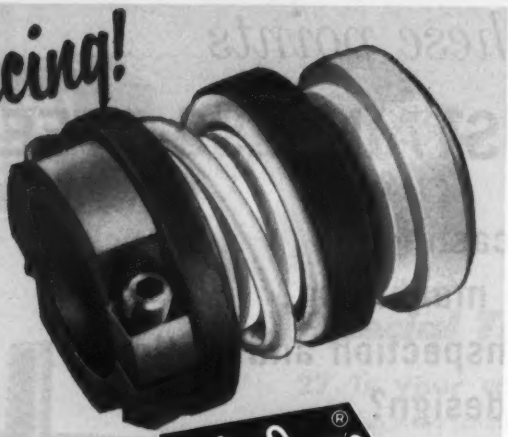

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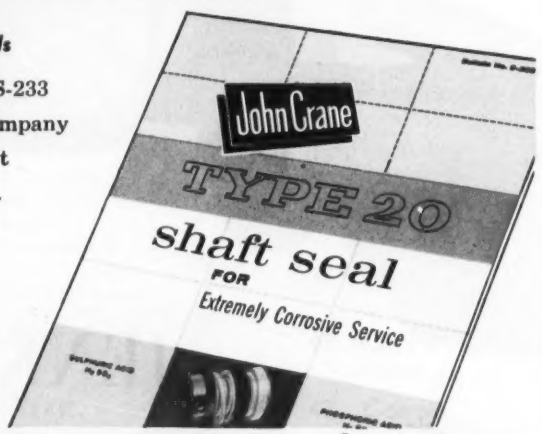

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CHEMICAL PROCESSING

July 1960
Volume 23 • Number 7

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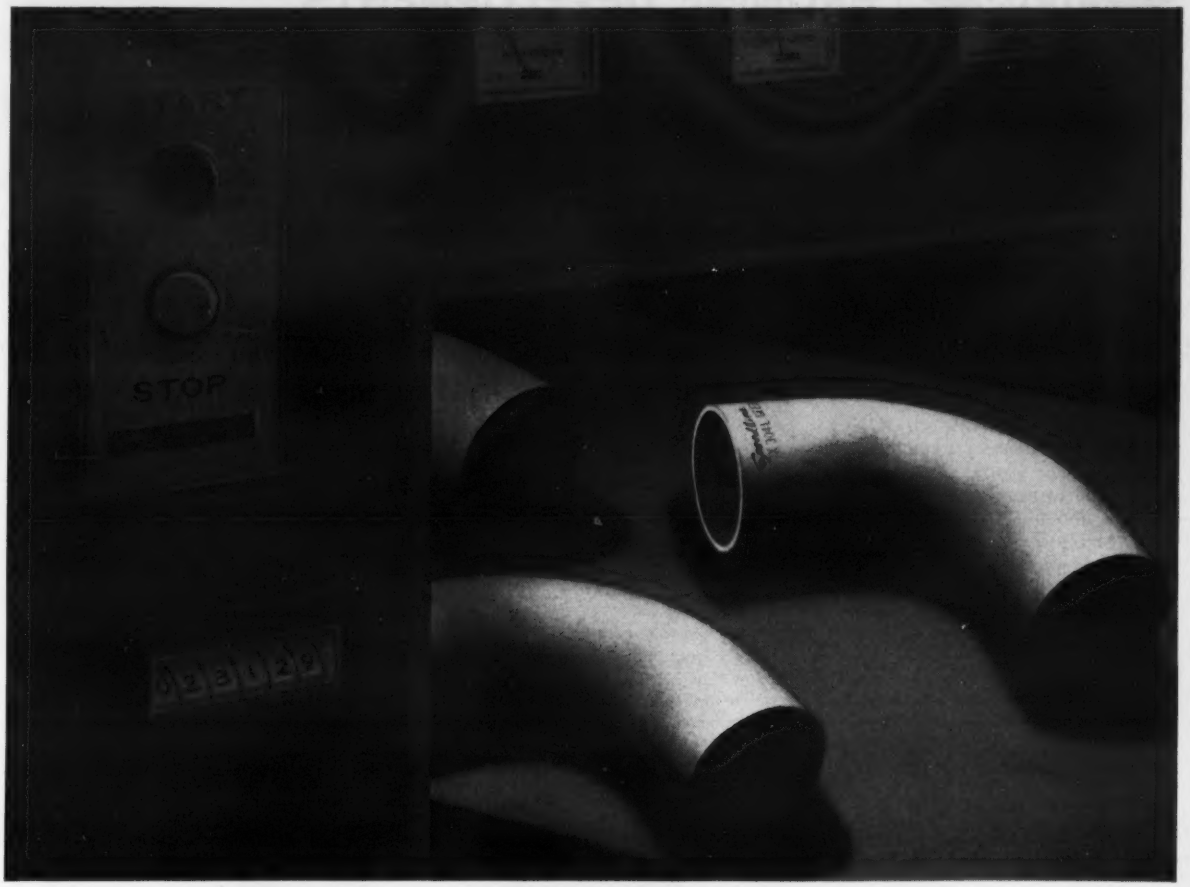

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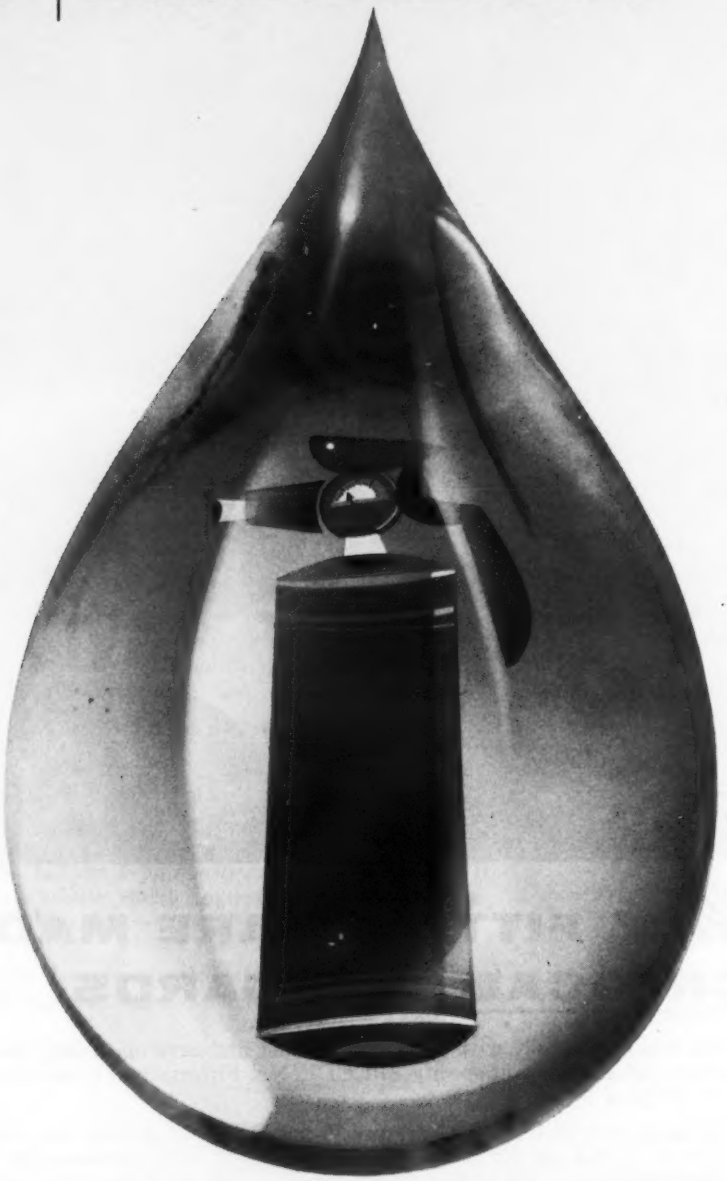

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For brominated organic compounds, this development opened up a new potential for a new field. Today, several brominated compounds have proved excellent for quickly smothering fire. And new ones are being developed. One bromofluoro compound, for example, shows great promise for speeding the work of crews fighting aircraft crash fires.

Many other brominated compounds are under continual study at Dow because of their unique fire extinguishing and retarding properties. In other applications, bromine and brominated compounds serve as chemical intermediates in thousands of reactions. And attention recently has been directed toward new bromine uses in building dense fluids.

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CHEM-TRENDS / Our Growing Industry

New chemical company buys Commercial Solvents unit, announces new plants

A newly created chemical company will make antifreeze, gasoline additives. Chatham-Reading Chemical Corp. has been formed by Philadelphia and Reading Corp., through acquisition of majority stock interest in Chatham Chemical Corp.

Houston Chemical Corp., Chatham subsidiary and now of new company, will build two plants costing $20 million at Beaumont, Tex., adjacent to a Socony Mobil refinery, which will supply ethylene over the fence. Plants will produce new anti-knock tetramethyl lead, as well as tetraethyl lead and ethylene oxide and its derivatives. Completion is scheduled in late 1961 and early 1962. Houston has purchased antifreeze and automotive chemicals marketing operation of Commercial Solvents Corp., to assure markets for the ethylene oxide, previously resold by CS. Sales of $40 million are anticipated.

Another Chatham-Reading subsidiary, Wabash Chemical Corp., is a sulfuric acid producer near Chicago.

Nopco Chemical Company is moving to fill its Plastics Division's needs for toluene diisocyanate (basic raw material for urethane foams) with erection of $7 million facility in New Jersey. Expected to be in production by January 1962, plant will have design capacity of 10 million lb, expandable to 20 million lb. Bechtel Corporation will handle design, construction.

Solar Nitrogen Chemicals, Inc., jointly owned by Atlas

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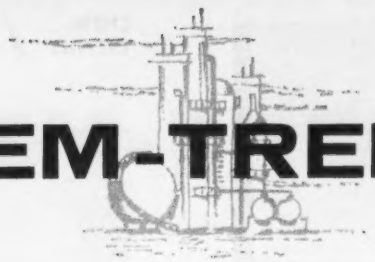
— AS CP's EDITORS SEE THEM

CHEM-TRENDS



Briefs

▸ Polymethylene, now a lab curiosity, should be watched, according to plastics veteran. Several firms said to be looking for commercial process.

▸ Polyvinylchloride manufacturers were taken to task for adding 25-40¢/lb to 10¢ PVC as the cost of plasticizing and stabilizing, by R. W. Finhold of G-E, before Chem. Market Research Assn. meeting. "The . . . chemical industry has not addressed itself enough to the problem to find low-cost stabilizers and plasticizers . . . It (PVC) could be one of our really low cost and very high performance materials . . ."

▸ Dependence on naphthalene-from-coal hurt phthalic anhydride producers during recent steel strike, when shutdown of ovens curbed output, boosted price of naphthalene. Now Scientific Design announces a fixed-bed catalyst that will give equally high yields with either naphthalene or the newer ortho-xylene available synthetically. Such convertibility is a trend of times, both with feedstocks and product compositions of newer plants. Watch for more on this.

▸ Battle to establish science policy machinery goes on behind the scenes in Washington, with President Eisenhower said to favor letting incoming President, not Congress, determine organization he wants . . .

▸ Half-ton/day excess salts and minerals is being removed from a quarter million gallons brackish water in Oxnard, Calif., with largest electrodyalizer ever put to such use, says Ionics, Inc.

▸ Engineers at Western Electric rejected their ESA union in a nationwide election May 10th. Vote was 3970 to 2603.

CPI's payrolls climb while employment steadies

1958 Census of Manufactures documents labor cost rise since 1954

RISING cost of labor in the chemical process industries may be a well-known fact. Recently, however, new information has become available which puts a specific price tag on added costs being borne by manufacturers. Advance reports of the 1958 Census of Manufactures conducted by the Bureau of the Census, U.S. Dept. of Commerce, give details which should interest all concerned with the industries' future.

Of the advance reports issued to date, 21 pertain to processing industries. These average zero change in numbers of employees, but average 21 percent increase in payroll! Here is breakdown, by Census industry category:

	employees	payroll
Indus. inorganic chems (code 2819)	− 6%	+17%
Pharmaceutical prepns (2834)	+ 7%	+31%
Petroleum refining (2911)	− 5%	+16%
Plastics materials (2823)	+25%	+54%
Fertilizers indus. (2871,2)	− 2%	+10%
Grease & tallow (2886)	+ 4%	+25%
Alkalis & chlorine (2812)	.....	+20%
Paints & varnishes (2851)	.....	+19%
Sulfonated oils & assts. (2843)	−25%	− 8%
Carbon black (2895)	− 3%	+16%
Synthetic rubber (2824)	+ 9%	+37%
Cyclic (coal tar) crudes (2821)	+10%	+48%
Fatty acids (2887)	−18%	− 5%
Intermediate & organic colors (2822)	−20%	− 6%
Glue & gelatin (2894)	.....	+24%
Inorganic color pigments (2852)	− 6%	+15%
Insecticides & fungicides (2897)	− 1%	+18%
Medicinal chems, botanicals (2833)	−11%	+10%
Synthetic fibers	+ 1%	+21%
Organic chems, not otherwise classified (2829)	+17%	+41%
Chem products, not otherwise classified (2899)	+22%	+48%
Average	zero	+21%

An Advisory Board for Flemming Prescribed By President's Committee on Food Additives

CHEMICAL additives to food, storm area since effective date of controversial Delaney Amendment, may get a more scientifically-based evaluation if certain recommendations to President Eisenhower are put into effect. These arise from a report just issued by the President's Science Advisory Committee Panel on Food Additives.

George Kistiakowsky, Eisenhower's special assistant for Science & Technology, had been asked to conduct an investigation on additives, with special reference to the question of carcinogenicity. Kistiakowsky convened a panel of technical authorities who produced report.

The panel believes that "an area of administrative discretion based on the rule of reason is unavoidable if the (Delaney) clause is to be workable, (and so) it is essential that this discretion be based on the most informed and expert scientific advice . . ."

Accordingly, the panel recommends:

1. That Secretary Flemming "appoint an advisory board to assist him in evaluation of scientific evidence . . ."

Such an advisory board "should be . . . of scientists . . ."

The board's function should be to "weigh evidence and to make recommendations to (Flemming) on the basis of available scientific data, both on applications for approval . . . and in all cases where withdrawal of a prior approval or sanction is under consideration . . ."

2. If existing legislation does not permit (Flemming) to exercise discretion consistent with recommendations of report . . . appropriate modifications in the law (should) be sought."

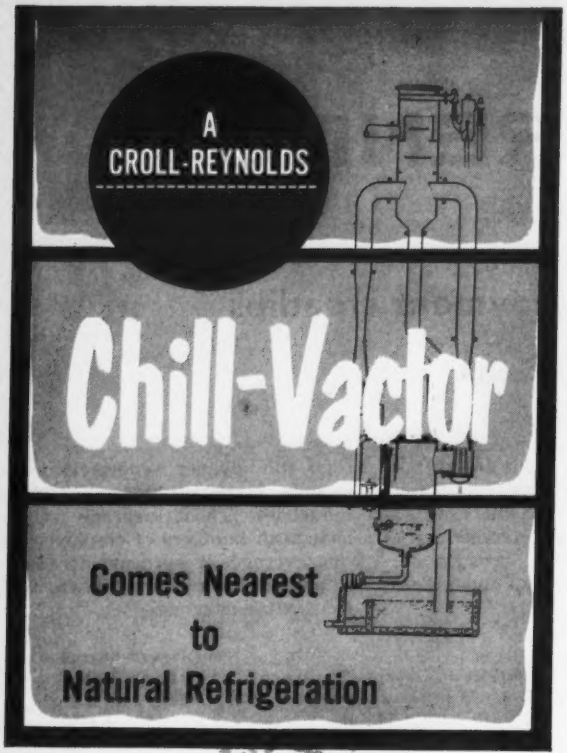
3. Because of limited scientific information available (about) effects of carcinogenic food additives, it is recommended that:

a. Proportionately greater emphasis be placed by Government Agencies on the study of . . . carcinogens in a variety of animal species . . .

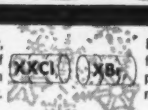
b. Studies be increased on the possible carcinogenic action of substances to which numbers of individuals have been regularly exposed (and compared with) incidence of cancer in exposed individuals.

4. "Research be expanded (by Government Agencies) and by industry to discover additional safe and effective materials for production and processing of foods."

In a statement prepared for publication, the National Agricultural Chemicals Association interprets the report as indicating that "safe levels can probably be established for some carcinogens . . ." and that "the Delaney Amendment might be revised to permit more scientific judgment in the evaluation of food additives."



Nature produces refrigeration (snow, sleet, and hail) indirectly by change of atmospheric pressure to bring warm water vapor in contact with cold air.



In each case, water is its own refrigerant or cold air serves the purpose. Jet vacuum refrigeration comes nearest to this natural refrigeration.

NO CHEMICAL REFRIGERANT OR ABSORBENT TO LEAK, CORRODE OR CRYSTALLIZE

As a method of industrial refrigeration, jet vacuum refrigeration is thoroughly established and is successful in many hundreds of industrial plants in capacities varying from a few tons to 4500 tons.

The unit sketched can be placed outdoors and operated continuously or intermittently in any climate. The equipment adapts itself readily to automatic control or is very easy to control manually. The unit is self-supporting. There are no moving parts, no noise, no vibration. The maintenance and supervision required are negligible.

While most vacuum installations are used to cool water, vacuum cooling is particularly efficient for cooling chemical solutions. Instead of the usual expensive heat transfer surface, only simple corrosion-resistant vessels are needed. Some process plants have dozens of separate units totaling thousands of tons of refrigeration just for the purpose of cooling chemical solutions. Their record of savings is remarkable.

There are many other applications, too. Fresh vegetables and other moist solids are readily cooled by jet vacuum refrigeration. By adding a heat exchanger bundle inside the vacuum chamber, gases can be cooled without circulating any liquid. In some cases, the automatic de-aerating effect of vacuum cooling is important.

Many installations of old style mechanical refrigeration could be replaced profitably with vacuum refrigeration, which costs much less to buy and somewhat less to operate.

Inquiries are given careful engineering study without obligation.

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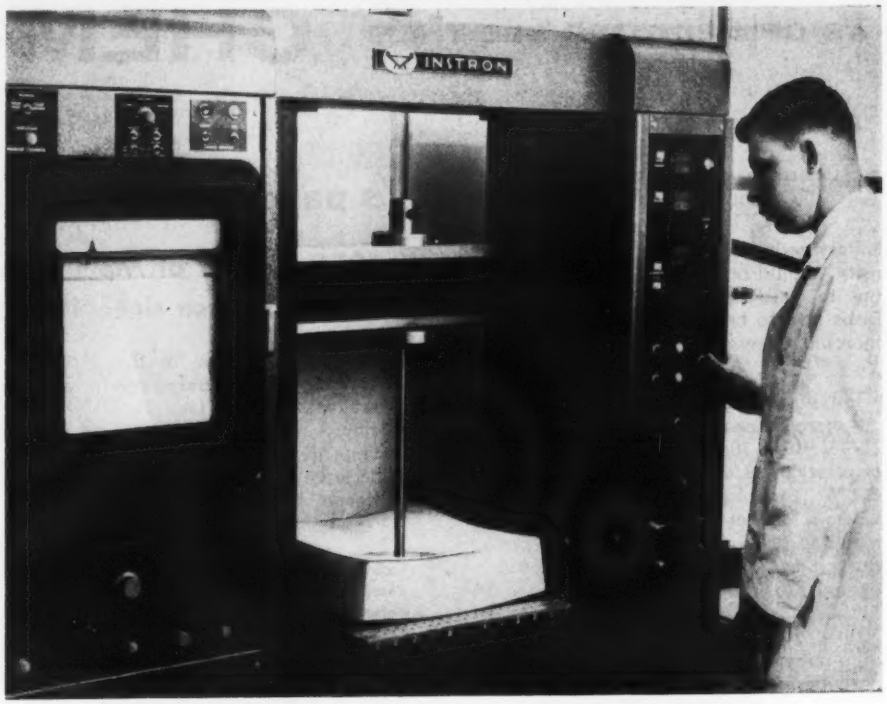
Check 3020 opposite last page.



Polyether foam sample under compression test at new Carbide Tech Center

Carbide centralizes tech service at new Tarrytown facility

More than 100 scientists engaged in customer and industry problems

SELLING chemicals and offering technical service many years ago was no easy problem. When Union Carbide Chemicals Company started its petrochemicals operations in the 20's formalized technical service was not available.

Harry McClure, now vice president of Union Carbide Corporation, was one of the first of Carbide's technically-trained chemical salesmen. In the roaring twenties he literally carried many new products from the test-tube through development and later into tank car sales.

Union Carbide Chemicals' new technical service laboratory at Tarrytown, N. Y., is a far cry from those early days. But the idea and the importance of technical service was generated a long time ago.

According to Ed Fogle, president, "Technical service can be a synergistic activity. It can develop new applications, provide better communications between customer, prospect and the company, develop application data for many industries, create ideas for new products, and what's more build company goodwill.

"We are aware of the ever increasing competitive picture in the chemical industry and thus have invested several million dollars in a facility that is dedicated primarily to customer service. In serving over 15,000 customers engaged in practically every type of business, we cover the broad spectrum of the industrial classifications of the bureau of the census. More than 400 synthetic organic chemicals which we manufacture are used in this broad range."

Setting forth the essential functions of the laboratory for the marketing groups, Dr. A. B. Steele, director, points out: "We shall assist customers in the proper use of company products, create an

awareness of changing markets, foster development of new uses for products, follow customer requirements for specific chemicals, and offer aid in training and retraining of sales representatives."

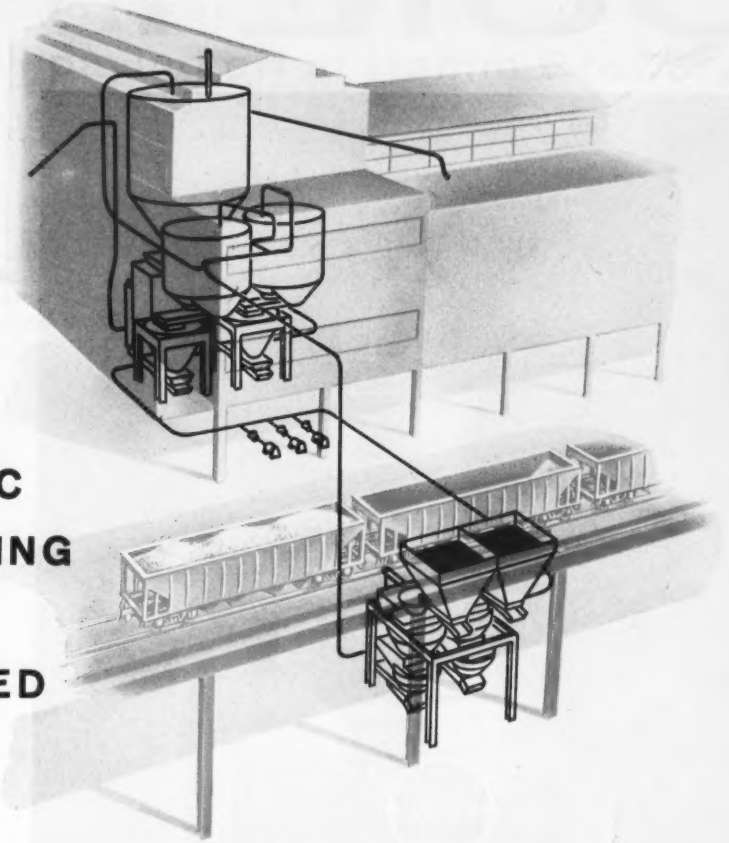
The new laboratory brings together functions that have been performed at many other spots. For example operations from Mellon Institute in Pittsburgh, Pa.; South Charleston, W. Va.; Tonawanda, N. Y.; Bound Brook, N. J.; Whiting, Ind.; and Milwood, N. Y.; have all been combined in this new operation. Now a concerted action with the combining of these operations will mean a better integrated and more serviceable operation to help customers and prospects.

The laboratory is industry orientated and divided into 29 industry groups. Much activity is going on now in aerosols, as well as futher investigation in polyether foams.

Working closely with the laboratory is Dr. R. L. Bateman, director of marketing development. His function in integrating this operation with marketing is an important one. He says, "The need for customer service is stronger than ever. It is no longer possible for a chemical marketer to take a new product to prospects and expect them to do the necessary development work."

John Field, vice president, marketing, said, "One can't lose sight of the fact that the 'sale' is the prime mover that activates manufacturing in all related activities. And in today's rapidly changing market, the sales representative must offer more than just a good product. He must also offer the technology that will help his customer to keep up with these changes and use the products profitably.

"We can't, of course, predict the specific developments to come from this laboratory in the next decade. But the 'success stories' of the past decade give us an idea of the types of improvements springing from effective customer service and use research."



PNEUMATIC TRANSPORTING FOR CONTROLLED FEEDING BY

ALLEN-SHERMAN-HOFF

The diagram shows an A-S-H pneumatic system designed to convey materials used in batch processing.

With this system, several materials are transported from track hoppers to separate storage bins in the plant. From a control panel at the track hoppers, one operator directs this flow of material to the appropriate bin. From the bins, the material is fed first into weigh bins and then, in controlled rates and quantities, directly into the proper batch. From another panel in the plant, a second operator controls this operation.

For such processes, pneumatic conveying systems are ideal. Compared with a mechanical system, the A-S-H pneumatic system is a tremendous space saver. In addition, it is flexible, versatile, and far more trouble-free.

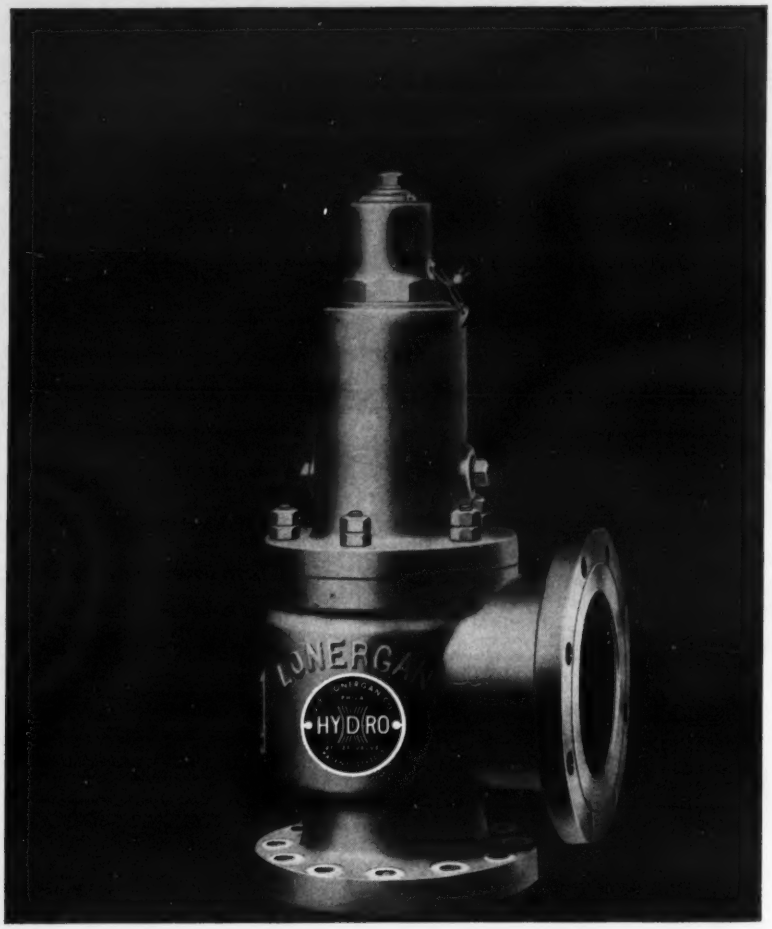
Recently, A-S-H published Bulletin PM-1 which describes pneumatic materials handling systems for the process industries. In it are described vacuum, pressure, and vacuum-pressure systems suitable for handling a wide variety of materials in all types of plants. Write for a copy.

THE ALLEN-SHERMAN-HOFF COMPANY, 257 East Lancaster Avenue, Wynnewood, Pa.

New Bulletin PM-1 can help pinpoint a system for your plant, your materials. Send for a copy.

Check 3021 opposite last page.

QUIET!



New Lonergan liquid relief valve doesn't chatter; eliminates product waste; reduces maintenance

Ever hear a relief valve chatter? They all do! They shout their faults to the world, while beating themselves to death. When you can hear one, you know product is being wasted; maintenance costs are increasing; employees are growing annoyed; and perhaps dangerous, flammable liquids are running loose.

Now you can install a Lonergan Hydro-Valve guaranteed not to chatter, hammer, or drum, *yet still deliver full rated capacity !* Gone is the need to install an oversized valve or a high-priced, heavyweight regulator valve to eliminate chatter on by-pass and emergency relief applications.

The Lonergan Hydro-Valve does not contain any capacity-reducing gimmicks or gadgets to eliminate chatter. Instead, it is designed to be completely quiet under all operating conditions. It proves itself so on hundreds of applications every day.

Bellows models of the Lonergan Hydro-Valve are also available for corrosive applications. The elimination of chatter and its associated bellows flexing action, greatly extends bellows life and virtually ends the need for expensive bellows replacement. *Full details are in a Hydro-Valve bulletin. Write for a copy today !*

Lonergan

J. E. LONERGAN COMPANY, 203 RACE STREET
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Check 3022 opposite last page.

Our Growing Industry

From page 8

Powder Company and Standard Oil Company (Ohio), will erect $15,000,000 plant near Joplin, Mo., to produce anhydrous ammonia, urea and related products. Ammonia unit to be completed in year.

Foster Grant Co., Inc., is venturing into polyolefins field with plans for erecting a multi-million dollar plant utilizing the Agfo process, a high pressure polymerization technique. Site of the plant to be engineered and constructed by Scientific Design Company, Inc., is to be announced. Long-range plans call for polymerization and co-polymerization of propylene, butylene and other hydrocarbons.

Rexall Drug and Chemical Company and **El Paso Natural Gas Company** are joining forces to produce olefins, polyolefins and chemicals from Odessa, Texas, plants scheduled to begin production in early 1962.

Initial capacity of olefin plants will be more than 200 million lb/yr while polyolefin plants will produce in excess of 150 million lb/yr.

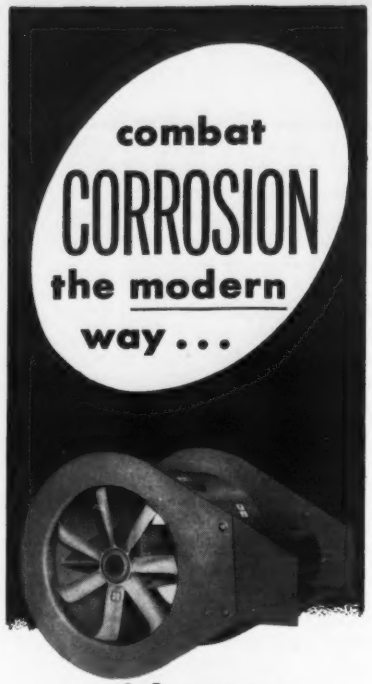
General Chemical Division of Allied will build large phosphoric acid plant at East St. Louis, Ill., works. Plant to be in operation early in 1961 with projected capacity of 50,000 tons/yr of wet process acid will supply midwest fertilizer manufacturers.

Dixon Chemical Industries, Inc., will join select group of six U.S. firms manufacturing hydrofluoric acid early in 1961 when $3.5 million plant is completed on 70-acre Paulsboro, N.J., tract, adjacent to its 300,000-ton sulfuric acid facility. HF plant will produce 11,000 tons/yr of hydrofluoric, plus 45,000 tons/yr of high quality anhydrous calcium sulfate.

Olin Mathieson Chemical Corporation will build and operate for Air Force a multi-million dollar anhydrous hydrazine plant at Saltville, Va.

Hercules Powder Company is quadrupling nitrogen tet-

To page 14



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DUCT FANS

Featuring a unique built-in orifice and tear-drop shaped belt housing, Aerovent *Fiber Glass* Duct Fans are designed for your "*problem*" ventilating requirements. Virtually unaffected by normal concentrations of corrosion and most forms of chemical attack, *fiber glass* – used in the construction of the fan housing and other internal surfaces – assures longer, more dependable service in even the most difficult applications.

Propellers are stainless steel or Dura–a special alloy created by Aerovent for better resistance to corrosive atmospheres. Available in 17 models in sizes 14" to 42" for capacities to 32,500 cfm.

write for bulletin 175

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Check 3023 opposite last page.

THAT'S INTERESTING

Exhaust purifier

Between 80 and 90% of hydrocarbons and carbon monoxide are burned by auto exhaust purifying system developed by Union Carbide Corporation. Device combines advantages of direct combustion with catalytic oxidation. Employing special catalysts in modest quantities, device is placed so as to take maximum advantage of engine heat. Development is proceeding.

Push-button permanents

American women will be able to cut 20 minutes from a beauty parlor visit with adoption of push-button permanents. Packaged in two aerosol containers—one for waving lotion, the other for neutralizer—set applies key ingredients of wave more efficiently and effectively.

For more information on product at right, specify 3024 see information request blank opposite last page.

Cost-cutting step taken 26 years ago still paying off at Hamm Brewery —they chose NONPAREIL Turbine Oil

Situation: In 1934 the Theo. Hamm Brewing Company installed two 1,000 kw. turbines. The brewing firm wanted to be sure there would be no downtime due to failure of the lubricant. Neither did the company want to spend time checking the oil's performance or adding new oil to sweeten the old.

What was done: Brewery management followed the advice of the Standard Oil lubrication specialist. They installed NONPAREIL Turbine Oil, the only oil, then as now, that carries with each fill a life-of-turbine guarantee.

What has happened: In 26 years since the turbines were put in service there has never been any downtime due to lubrication problems. In 1947 a 2500 kw. turbine was added to the system and another 3000 kw. unit was put in service in 1953. These, too, have used NONPAREIL Turbine Oil with the same results.

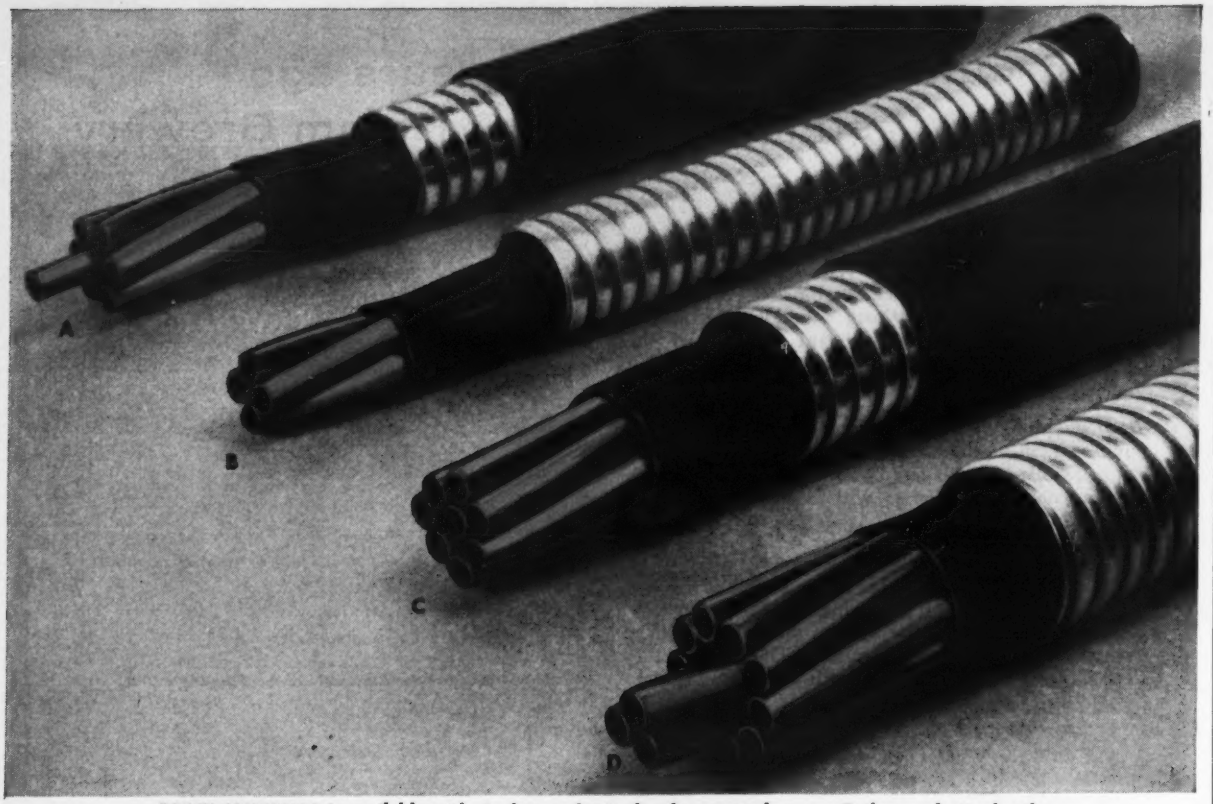
What you can do: Get the full story on NONPAREIL Turbine Oil from the Standard Oil office near you in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about **NONPAREIL Turbine Oil**

- Will not permit formation of harmful acids
- Will not permit formation of sludge or oil varnish
- Will maintain good demulsibility or water separating characteristics
- Has high resistance to foaming
- Contains adequate rust inhibitor

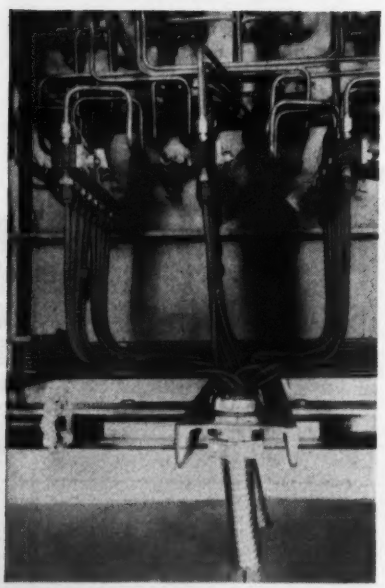
You expect more from **STANDARD** *and you get it!*

Hamm Brewing Co. assistant chief engineer Steve Wappel and Standard's Dick Anderson discuss recent oil analysis. Dick Anderson knows his way about an industrial power plant. He's been providing customers with technical service on lubrication for five years. Dick has an engineering degree from the University of Minnesota and has completed the Standard Oil Sales Engineering School.



BAILEY ARMORTUBE is available with *A*, thermoplastic sheath over steel armor; *B*, thermoplastic sheath under steel armor; *C*, thermoplastic sheath over and under steel armor; or *D*, with just steel armor.

For its "Armortube" control system cables, Bailey specifies Anaconda precision copper tube in long coils



A TYPICAL INSTALLATION of Bailey Armortube in a large utility, indicating the large number of separate lines carried by two easily installed cables.

Armortube® flexible, armored, multiple-tube cable made by Bailey Meter Company, Cleveland, Ohio, has saved up to 40% of single-tube installation and maintenance costs in pneumatic, metering and control systems.

Armortube cable is available in lengths up to 1000 feet and in bundles of up to 19 individual ¼" O.D. copper tubes. Steel interlocking armor protects the tubes from mechanical damage and simplifies installation. In addition, various combinations of thermoplastic sheathing are available to provide further protection from moisture and corrosive atmospheres during and after installation.

CLEAN AND DRY. The copper tubes must meet rigid quality specifications, and Bailey has found that Anaconda copper tube consistently meets its requirements. Anaconda takes special care to see that inside surfaces are clean, smooth, and bright–free from dust, dirt, or metal chips which might interfere with the operation of delicate air and hydraulic circuits. Tube ends are sealed to keep out moisture and foreign matter during storage.

FLEXIBLE AND ACCURATE. Anaconda copper tubes are uniformly soft, highly flexible–for easy bending during installation. And they are accurate in size and shape.

LONG LENGTHS. For applications such as instrumentation, Anaconda can produce copper tubing in coils up to 2200 feet for ¼" O.D.–up to 1400 feet for ⅜" O.D.–up to 1000 feet for ½" O.D.

QUALITY TUBE AND CREATIVE TECHNICAL SERVICES. Whatever your requirements for precision copper tubing–instrumentation or capillary tubing, or restrictor tubes – Anaconda specialists can help you find the most economical way to do the job. For such technical assistance, see your American Brass representative, or write: French Small Tube Division, The American Brass Company, Box 1031, Waterbury 20, Conn. 6069

ANACONDA®
INSTRUMENTATION TUBING

Check 3025 opposite last page.

Our Growing Industry

From page 12

roxide production facilities at Hercules, Calif., first such plant in West. Increased production is expected to be available early in third quarter of this year. Nitrogen tetroxide is oxidizing material used in liquid-fueled rockets.

Standard Chlorine Chemical Co., Inc., is producing high quality hexachlorobenzene from just completed plant at South Kearny, N.J. Employing novel design, plant has capacity of over 2 million lb/yr—equal to current industry needs.

Ashland Oil & Refining Company has switched signals on plans for commercial hydrodealkylation plant which will be located at Catlettsburg, Ky., instead of Buffalo, N.Y., and will have 25% higher capacity. To go on stream prior to March 1, 1961, anticipated capacity is 75 million lb/yr of napthalene and 15 million gal/yr of benzene.

Rohm & Haas Company will modify idle butadiene plant at Louisville, Ky., which it obtained in open bidding from U.S., for general chemical manufacturing—possibly acrylic monomers and polymers. Operations will not begin before mid-summer, 1961.

Food Machinery and Chemical Corporation's Chlor-Alkali Division will expand soda ash output in Green River, Wyo., to 750,000 tons/yr, a 200,000 ton increase. First phase will be completed by early 1961; second by 1962.

J. M. Huber Corporation's Carbon Black Division is expanding capacity of its Eldon, Texas, carbon black plant to produce 60 million more lb/yr. Addition will cost $2,500,000.

Sun Oil Company is building $3.6 million propane deasphalter—rated largest in U.S.—at its Toledo, Ohio, refinery. Scheduled for completion next spring, it is being designed for 10,500 bbl/day charge.

Pittsburgh Chemical Company's $4 million maleic anhydride plant at Neville Island is slated to go on stream early in 1961 with annual capacity of 20 million lb.

Watching Washington

Two-phase MCA Program Tells True Additives Story

The Manufacturing Chemists' Association has launched a two-part public-relations program to present to the public the factual aspects of the food-additives controversy.* The first, now underway, is an interim direct-mail program disseminating authoritative information to key opinion-leader and chemical-industry people.

The second phase of this campaign is a long-range informational and educational program directed primarily to home economists, demonstration agents and similar groups. It will reach the action stage in the fall. Educational consultants Glick & Lorwin are conducting the two-year campaign.

The direct-mail effort began in early March with the mailing of kits of materials to chemical industry personnel in more than 700 locations. This was part of the April Chemical Progress Week observation. News bulletins have been issued to the year-round Chemical Industry Activity Committees suggesting easy activities to reinforce the public view of the U.S. food supply as the best in the world.

Printed material sent to CIAC groups for telling the industry story include the Food and Drug Administration booklets, "Food Facts vs Food Fallacies" and "What Consumers Should Know About Food Additives"; scientific reviews of the book, *The Poisons in Your Food* by William Longgood; a copy of sources and bibliography for scientific information on modern food technology; and reproductions of typical press clippings reflecting the sensational treatment given the food-additives problem by the popular press.

The long-range educational program will have as its objective bringing an understanding to a significant group within our society that food is better and safer because of modern food technology — to which chemistry is a big contributor.

The program will take the form of a series of publications and sound filmstrips.

Two New Projects Push U.S. Exports

Export possibilities for industry are being given a push by two projects of the Department of Commerce. They are part of the National Export Expansion Program. An Export Promotion Team will explore foreign-trade opportunities in five widely separated areas of the world — Mexico-Central America, Australia-New Zealand, Nigeria, Viet-Nam and the Near East.

Five two-man teams from the Bureau of Foreign Commerce, each pairing an expert from the Office of Trade Promotion with a specialist from the Office of Economic Affairs, are now abroad conducting surveys.

The teams will consult with American and local businessmen, trade groups, and U.S. embassy and foreign-government officials. A special effort will be made to identify products for which there are opportunities for larger American sales.

Findings of the two-man teams will be used in a report on U.S. market potential and problems in each country. Then appropriate constructive action on problems is planned along with an information program for the U.S. business community. Plans are also under way for increasing both trade missions of American businessmen in partnership

*Three recent articles in CP have dealt with the factual aspects of the food-additives controversy: "The Food Additives Amendment," Dec. 1959, p. 30; "Will Delaney Clause Make Food Safer?," Mar. 1960, p. 28; "Anti-Chemicals Cannons Keep Roaring," May 1960, p. 22.

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Special compound impervious to actions of oil, acids, alkalies, animal fats and most other solids and solutions. Smooth, flexible, easy to wear. Highly resistant to snagging and puncturing. Extra-grip finish on finger tips.

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Rubber Boots and Lace Work Shoes, with or without "Toe-Saver"® Safety Toe. Slip-resistant soles. Molded Neoprene Work Rubbers and 10" Over-the-Shoe Boots.

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See Pages 338-339, Chemical Engineering Catalog

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Check 3027 opposite last page.

with government and overseas trade-fair exhibits.

Also a part of the long-range export drive launched by the President in a special message to Congress in March are the 33 newly organized Regional Export Expansion Committees. Headed up by leading businessmen including members of the CPI, these groups will aim at creating greater interest in export sales abroad.

Trade-restriction Data Collected by CPI

The CPI will furnish the Department of Commerce with detailed lists of countries where trade restrictions are being encountered, and the products affected.

Representatives of the industry, which does an export business of a quarter of a billion dollars annually, discussed trade problems recently with officials of the Department of Commerce. Industry spokesmen told the Department that they expect new tariff barriers as a result of the functioning of the Common Market.

Import licensing designed to protect local industries, as well as tariff restrictions, also are hindering sales in Latin America, they said. Special mention was also made of the growing trade between Latin American and Iron Curtain countries under bilateral agreements.

Members of the industry feel that the new Export-Import Bank credit guarantees, set up as part of the Government's intensive foreign-trade drive, would be helpful.

This meeting was the ninth in a weekly series the Department of Commerce is holding with key industries. The goal is to develop ways in which the Government may seek to ease foreign restrictions and promote the exports of U.S. goods. Information thus gathered at these meetings will be used by U.S. negotiators when they discuss concessions with representatives of foreign governments at the forthcoming sessions under the General Agreement on Tariffs and Trade.

Problem:

To speed up pepper grinding without losing volatile oils

Solution:

SPROUT-WALDRON

ROLLER MILLS

To grind pepper to −40 mesh at production rates from 2-3000 pounds per hour without generating excessive heat or causing unnecessary loss of volatile oils, Durkee Famous Foods, Bethlehem, Penna., installed a Sprout-Waldron pepper grinding system.

Heart of the system is the one-point control double roller mill. Design of this unit permits operator to set and align rolls with complete accuracy in a matter of seconds. The higher the production requirements, the more important is this one-point control feature.

For full details on the Durkee system, ask for Pointers, Vol. 2 No. 5. For specifications on the roller mill request Bulletin 153-A.

CW/109

SPROUT-WALDRON

Muncy, Pennsylvania

Size Reduction • Size Classification • Mixing
Bulk Materials Handling • Pelleting

Check 3028 opposite last page.

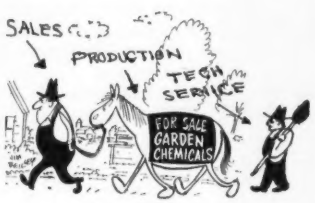
Original Cartoon

Can you top this?

Sirs:

Enclosed is a modification of the cartoon which appeared on p. 52 of your February 1960 issue. It was worked up by chemical engineers J. H. Cransen and E. S. Hestel of our organization.

R. F. HAZELTON
Nitrogen Division
Allied Chemical Corporation
Hopewell, Va.



Modified Version

Piggybacking post-mortem

Sirs:

With reference to the article on piggybacking (May CP, p. 28), I would like to mention the interest that seems to have been generated in so-called jumbo tank cars.

There is nothing wrong with the jumbo car if it can be used, and there are cases where it is being used. The ability to use it, however, is still quite limited and will remain so for many years to come. Some of the heaviest liquids produced by the chemical industry and moving in large quantities cannot take advantage of it, and there are a number of other factors.

It was interesting to note a report submitted at the February meeting of the Traffic Committee of Manufacturing Chemists' Association. The

TYLER can help you screen new ideas

When you have a new application involving woven wire screen for processing materials, here's how to get the right answers: Turn to W. S. Tyler, the leading producer of woven wire screens for industry.

Usually, Tyler can give you the answer based on actual operating experience. But when new ideas and new problems are presented, our Customer Service Laboratory will dig in and come up with the solution. Samples of your raw material can be shipped to this Laboratory and tested on a variety of equipment, to pre-determine capacity and performance in plant operation. This enables us to positively recommend the proper screen for your requirements . . . by selection from over 53,000 existing specifications, or by development of a new one.

Specify Tyler woven wire screens for your processing and be sure it's right for the job.

TYLER

WOVEN WIRE SCREENS • SCREENING MACHINERY
TESTING SIEVE EQUIPMENT

The W. S. TYLER Company • *Cleveland 14, Ohio*

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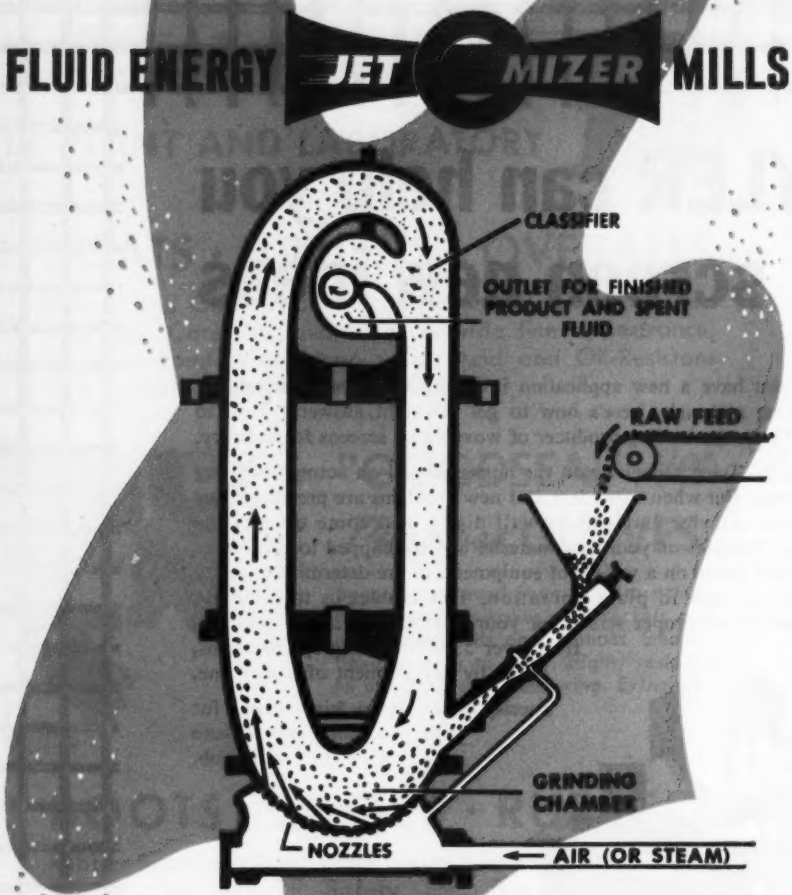
Check 3029 opposite last page.

for GRINDING AND DEHYDRATION
FINER PARTICLES
LOW MAINTENANCE

FLUID ENERGY JET-O-MIZER MILLS



The Fluid Energy "Jet-O-Mizer" Mill, designed and built by the pioneers in fluid energy fine grinding, does far more than produce fine particles. It controls fineness and product quality with a narrow distribution range and simultaneously with grinding can dehydrate, coat particles, blend and achieve chemical changes.

Jet-O-Mizer Mills are being used all over the world, processing many types of materials in the following industries:

- Abrasive
- Food
- Pigment
- Wax
- Insecticide
- Mineral
- Plastic
- Metal
- Ceramic
- Pharmaceutical
- Carbon
- Chemical

"Jet-O-Mizing" produces FINE PARTICLES ¼ micron average and above PLUS . . . Narrow Particle Distribution • Dry, or Controlled Moisture Content • Continuous Operation • Uniformity of End Product • Other Operations with Grinding • No Attritional Heat — No Moving Parts • Low Operating Costs • Low Maintenance

Send for complete information on Fluid Energy's "Jet-O-Mizer" Mills, "Jet-O-Clone" Dust Collectors, and TESTING AND CUSTOM GRINDING services.

FLUID ENERGY PROCESSING & EQUIPMENT COMPANY
Richmond & Norris Streets, Philadelphia 25, Pa. • Phone: Regent 9-7728
(Formerly known as the Wheeler-Stephanoff Mill)

Check 3030 opposite last page.

LETTERS

following section of the report had to do with tank-car supply:

"The number of new cars on order is high, but few are in the larger sizes. In fact, large cars on order are perhaps at the lowest figure for the past two years."

While on the surface this may appear unusual in view of the interest in jumbo cars, the commercial aspects of using this type of equipment, when thoroughly understood, will explain the "go slow" attitude toward them.

FRANK G. MOORE
General Traffic Manager
Columbia-Southern Chemical Corporation
Subsidiary of Pittsburgh Plate Glass Company
Pittsburgh, Pa.

Sirs:

In his article in your May issue, Mr. Berg states that "out-of-pocket line-haul costs for motor carriers are believed to average about 2.5¢ per ton-mile here, although some authorities say they are closer to 4.5¢." I know of no general-commodity motor carrier handling less-truckload and truckload business whose costs are as low as 2.5¢ per ton-mile. Many of them have claimed that in order to be successful they must have even more than 4.5¢ and some have gone as high as 6¢ per ton-mile.

C. H. BEARD
General Traffic Manager
Union Carbide Corporation
New York

Sirs:

I've just finished reading the piggyback article and I must say you have given the whole subject the careful and thorough treatment it needs. I would like to point to your caption on p. 30 referring to the authority of general commodity carriers to use Sealdtanks. Motor common carriers actually can carry any size Sealdtank they would like, and in fact a number do.

The so-called "restriction"

To page 20

What's News in Milling?

"KNOW-HOW" MAKES A BIG DIFFERENCE, TOO!

In chemical milling operations two things have to be right for best results:
1. The equipment
2. The way it is used

The overall thing that ties them both together is "know-how".

What's so new about that?

Nothing, except that Morehouse-Cowles representatives continuously run into cases where one or both are wrong. And then the news is bad — quality and volume suffer, costs skyrocket.

Because of the "know-how" gained from broad experience with the most popular mill of its type on the market, they have been able to produce spectacular improvements in many instances. Production rates are being upped from 2 to 10 times on products like these —

- Ceramic Materials
- Chemicals
- Chocolate Products
- Coatings
- Confectionery Fillings
- Cosmetics
- Fertilizers and Insecticides
- Food Pastes
- Greases & Lubricants
- Mustard
- Paints, Varnishes, Etc.
- Paper Coatings
- Peanut Butter
- Petroleum Products
- Pharmaceuticals
- Printing Inks
- Textile Dyes & Finishes
- Tobacco Products

and hundreds of other products requiring grinding, dispersing, mixing, emulsifying, homogenizing, disintegrating.

If your product requires milling, it may pay you well to consult with a Morehouse-Cowles milling expert. New Super Series Morehouse Mills plus the most "know-how" have brought about a new day in milling.

Write us today about your problem.

MOREHOUSE-COWLES, INC.
1150 San Fernando Road, Los Angeles 65, Calif.

MOREHOUSE COWLES

Representatives in Principal Cities
Convenient Lease and Time-Payment Plans

Please send me information on use of Morehouse Mills in processing (product) _____
Name _____ Title _____
Firm _____
Address _____
City _____ Zone ____ State _____
614

Check 3031 opposite last page.

Get Durco Sleeveline Type F non-lubricated plug valves for your most severe corrosive or erosive services

You can handle acids such as sulphuric, hydrofluoric and nitric; solvents, caustics, chlorine gas or liquid, chlorinated organics, plastic resins, high vacuums and corrosive slurries with little or no maintenance problems.

Durco Type F valves are available in Durimet-20, 316 Stainless, Monel, Chlorimet-2, Chlorimet-3, and Nickel. Flanged or screwed, in sizes from ½" to 6". 2 or 3 way design, 150 psi and 300 psi ratings.

Write today for informative Bulletin V/4b.

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

For more information on product at right, specify 3032 see information request blank opposite last page.

THE DURIRON COMPANY INC., Dayton, Ohio / Valves • Pumps • Filters • Process Equipment

TROYFELT, a non-woven synthetic Dacron, gave best performance in military vehicle

To meet such rigid military filter specifications as 100% filtering efficiency in heavy dust conditions in sub-zero to tropical temperature extremes with resistance to oil, moisture, rot and mildew, sixty materials were tried and only one, Troyfelt, met the test as the filter on an engine intake air cleaner.

This success was due to Troyfelt's mechanically interlocked fiber construction. The absence of chemical binders or binder fibers prevents blinding and the structure gives Troyfelt unusually high, long-lived strength, excellent resistance to fungi and bacterial growth, chemicals, moisture, oil, abrasion, stability to temperature extremes.

Write for our bulletin describing other filter applications as well as applications on insulators, seals, padding, packings, gaskets and many others.

TROYFELT . . . *by the pioneers of non-woven synthetic felts*

INDUSTRIAL PRODUCTS DIV. • TROY BLANKET MILLS

200 Madison Avenue • New York 16, N. Y.

Check 3033 opposite last page.

A CONTROL SYSTEM with ORIGINALITY and RELIABILITY

"A major breakthrough in temperature control"

SATURABLE POWER REACTOR CONTROL AND *Range-Lock PROTECTION

MECHANICAL CONVECTION OVENS

GUARANTEED TO OUTPERFORM ALL OTHERS IN RELIABILITY, SAFETY, AND CONTROL ACTION.

POWER-O-MATIC — THE NEW STANDARD OF PERFORMANCE

*Range-Lock — FAIL-SAFE POSITIVE PROTECTION AGAINST OVERHEATING

POWER-O-MATIC-60 — COMPLETELY STEPLESS REGULATION OF TEMPERATURE. SWITCHLESS; INFINITELY PROPORTIONAL. FULLY AUTOMATIC.

POWER-O-MATIC-60 — NO AUXILIARY ELEMENTS OR SWITCHES. NO ELECTRONIC AMPLIFIERS OR TUBES. NO PHOTO CELLS. NO TIMING DEVICES. NO MERCURY OR MECHANICAL RELAYS OR SWITCHES TO ARC.

NO MOVING PARTS

RELIABILITY

EFFICIENCY

BETTER PRODUCTS THRU VISION AND SKILL

2 RANGES 356°F. and 650°F.

Write for free Bulletin 1960

ECONOMICAL COMPETITIVELY PRICED with ovens utilizing standard ON-OFF cycling type control systems.

BLUE M *Electric Company*

138th and Chatham Sts., Blue Island, Illinois

BRANCH: Blue M Engineering Co., 2312 So. Main Street, Los Angeles 7, California

Check 3034 opposite last page.

LETTERS

From page 18

was merely the latest of a series of recommendations made by ICC examiners to the full Interstate Commerce Commission. In other words, the issue won't be settled until the full ICC actually hands down a ruling. Even then there will undoubtedly be appeals and further decisions; in the end, the matter may go before the Supreme Court. My understanding of it is that there will probably be no hard and fast decision before 1961.

WILLIAM L. HENNEFRUND
Public Relations Department
United States Rubber Co.
New York

German Patents

On p. 11 of the February 1960 issue of CP we published a letter from Dr. H. Mohring of Farben-Fabriken Bayer AG concerning the availability of information from their Central Information Service.

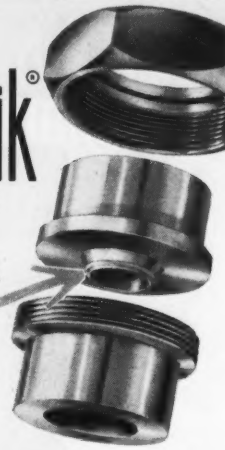
He has asked us to announce that their listing of German Patents in the Field of Organic Chemistry is being brought up to date. This compilation of patents had been discontinued for some years. A 1938-1945 List is now available. The entire work amounts to over 12,400 pages. A 1950-51 list is being prepared and will be available this year.

Requests for further information on these patent listings may be addressed to Dr. Mohring in care of this magazine or directly to him at Farben-Fabriken Bayer AG, Leverkusen, West Germany.

Systematic-purchasing concept is outlined in 22-page booklet which provides detailed approach to systematic appraisal of product value in business purchasing. Described are methods utilized by General Electric to improve its general purchasing methods by a more scientific application of analysis technique. Scaled check list for evaluating equipment suppliers is included. It can be used for appraisal of added values such as reliability, technical capabilities, after-sale service, availability, buying convenience, and sales assistance. "Productive Purchasing"—General Electric Company.

Check 3035 opposite last page.

only Koncentrik® STAINLESS PIPE UNIONS give you a fully confined TEFLON SEAL



Patented construction provides double sealing action. Excellent for high pressure and high vacuum applications. Pressure ratings 2,000# to 6,000#. Screwed or socket weld ends, for pipe sizes to 2". Send for catalog today.

THE SPECIAL SCREW PRODUCTS COMPANY — SSP

BEDFORD, OHIO

Check 3036 opposite last page.

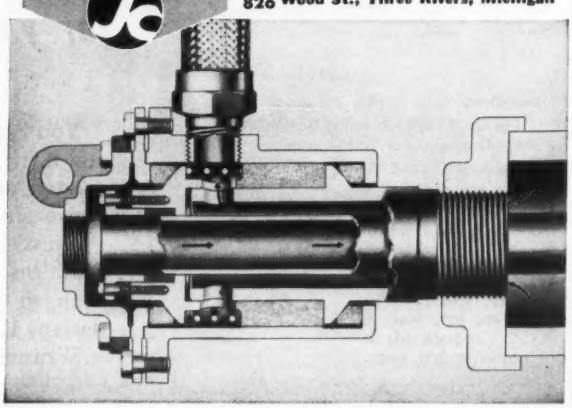
STANDS ALONE!

Type SN Johnson ROTARY PRESSURE Joint

There's not another rotary joint like the Johnson Type SN. Used where inlet or outlet pipe must rotate with the roll—on certain paper machines, drilled rolls of rubber or plastic mills and calenders, double shell dryers, and the like. Needs no external supports of any kind. Like all Johnson Joints the Type SN seals without packing, needs no lubrication or adjustment.

Investigate Johnson Joints for all steam-heated or water-cooled rolls. Handle Dowtherm, Monsanto Aroclors, hot oils too. Sizes to 8". For data on Type SN write for Bulletin N-2002.

THE JOHNSON CORPORATION
826 Wood St., Three Rivers, Michigan



Check 3037 opposite last page.

Spotlight On People

Executive V.P. Loughlin moves up to presidency of Celanese Corp.

Kenneth C. Loughlin, executive vice president since 1956, has been elected president of Celanese Corporation of America, succeeding **Harold Blancke,** who will continue to serve as chairman and chief executive officer of the Corporation.

Named to the newly established position of vice president-financial was **James R. Kennedy,** vice president in charge of industrial relations since August 1957.

The new president joined Celanese in 1929 after graduating from North Carolina State College with B.S. in textile chemistry and dyeing.

A Celanese director since 1954, he has been chairman of the corporation's management committee since its establishment in 1956.

Charles J. Haines, one of the founders and president of Chemetron Corporation for 23 years, has been elected chairman and chief executive officer, a new post. **James W. Dunham,** vice president and chairman of the finance committee, was elected president. He will continue to serve as finance chairman.

Raymond H. Marks, formerly vice president in charge of sales for Cary Chemicals Inc., has been appointed executive vice president.

Alfred H. Drewes and **Sidney F. Thune** have been added to the board of directors of National Starch and Chemical Corporation.

Dr. Louis Fernandez, director of nitrogen products for Monsanto Chemical Company's Inorganic Chemicals Division, has been appointed director of sales for marketing administration.

John L. Damon, previously agricultural chemical sales manager, has been appointed director of agricultural chemicals of Allied Chemical's General Chemical Division.

Receiving new executive assignments in the research and development functions of Monsanto Chemical Company's Organic Chemicals Division are: **Dr. James H. Lum,** director of research and development, to new position of director of technology; **Monte C. Throdahl,** director of development, to director of research for the division; **L. Edward Klein,** assistant director of development to director of development; **Dr. Ferdinand B. Zienty,** director of research, to director of advanced organic chemicals research within the division research department.

John A. Marsh has been elected president, **L. E. Grubb,** vice president-sales, and **E. M. Kline,** vice president-operations, of the Huntington Alloy Products Division of The International Nickel Company, Inc.

Onyx Chemical Corporation, has appointed **Dr. Reginald L. Wakeman** as vice president and director of research and development.

Eldridge J. Black becomes vice president and general manager of Stepan Chemical Company's newly-formed Industrial Chemicals Division. He was formerly vice president of sales for Stepan Chemical Company.

Dr. Kenneth Johnson has been appointed director of research administration, for the Chemstrand Research Center, Inc., Chemstrand Corporation.

Harry F. Brown, retiring as general manager of E. I. du Pont de Nemours and Company, Inc. Explosives Depart-

Now Available!

CHEMTROL
"ALPHA SERIES"
PLASTIC PUMPS
IN PENTON*

for handling
HOT CONCENTRATED ACIDS, ALKALIES, SALTS and MANY SOLVENTS!

Newest plastic pump design! Molded from Penton* for widest possible corrosion resistant service even at elevated temperatures. Safely handles corrosive chemicals such as concentrated sulphuric acid, concentrated chlorine solutions, ferro-cyanide bleach and concentrated sodium hydroxide. Features high operating efficiencies, excellent balance, low maintenance.

Positive mechanical seal maintains exceptional corrosion resistance and eliminates all metal subject to corrosive attack. Seal consists of Teflon ring rotating against ceramic faces of near-diamond hardness ground to tolerances measured in light waves.

For long, trouble-free pump life check Chemtrol. Ask for operating data, chemical resistances, prices. For recommendations send operating requirements.

SPECIFICATIONS: Chemtrol "Alpha Series" Pumps

Availability: Close coupled, immediately; pedestal mount to follow.
Size: 1" outlet x 1¼" IPS inlet.
Materials: Body, impeller and seal housing in Penton.*
Shaft Seals: Mechanical with Teflon seal rotating against stationary ceramic sleeve.
Motors: ¼ to 2 h.p.; 1750 to 3500 r.p.m. Drip proof, fully enclosed or explosion proof.
Impellers: Enclosed type with optimum contour design. Open type for special service.

**Hercules Powder Co.*

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CHEMTROL
404 West Central Avenue • Santa Ana, California

Check 3038 opposite last page.

THIS IS THE YARWAY STEAM TRAP THAT GIVES AN EASTERN RUBBER PROCESSOR...THESE BENEFITS

MORE UNIFORM HEAT ON PLATENS
IMPROVED QUALITY OF PRODUCT
LOWER STEAM CONSUMPTION
REDUCED MAINTENANCE

THE YARWAY No. 30 WILL GIVE *YOU* ALL THESE ADVANTAGES—AND MORE! FOR EXAMPLE:

ECONOMY OF OPERATION ON LIGHT LOADS

Closer condensate control—opens wide to discharge condensate at full capacity, closes immediately on steam

LONGER SERVICE LIFE

Lever action reduces impact on valve seat—lessens wear, provides quieter operation, longer life

LOWER MAINTENANCE

Only Yarway offers an Impulse Trap with renewable seat and disc that can be quickly replaced without removing the trap from the line

Prove it to yourself . . . in your own plant.
No. 30's are stocked and sold by 270 Industrial Distributors. Ask yours to arrange a free 90-day trial . . . or write

YARNALL-WARING COMPANY
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YARWAY

A MARK OF QUALITY IN STEAM ENGINEERING

Check 3039 opposite last page.

PEOPLE

ment after 43 years with the company, is being succeeded by **Charles Brelsford McCoy,** general manager of the Elastomer Chemicals Department.

Robert E. Swisher has been named to the new post of vice president, marketing of Alsynite, division of Reichhold Chemicals, Inc.

Synco Resins, Inc. announces the election of **J. Whitney MacDonald** as president and general manager.

Irving B. Polhemus has been elected vice president, Acme Resin Corp. He continues as general manager.

Thomas F. Willers is new president of Hooker Chemicals Limited. He is also a vice president of Hooker Chemical Corporation, in charge of its four divisions and corporate engineering.

Directors of Abbott Laboratories have elected two new vice presidents and a new member of the executive committee. Named vice president in charge of production was **Dr. Charles S. Brown,** formerly superintendent of production. He succeeds **Hugh D. Robinson,** retired. **Peter J. Marschall,** formerly manager of the engineering division, was elected vice president in charge of engineering. Elected to the executive committee was **Harold D. Arneson,** president and general manager of Abbott Export Subsidiaries.

Sun Oil Company has promoted three vice presidents to newly-created senior posts and elected three additional vice presidents. Senior vice presidents are **Jno. G. Pew, Clarence H. Thayer** and **Willard W. Wright.** New vice presidents are **Thomas S. Horrocks, Chalmer G. Kirkbride** and **Kingsley V. Schroeder.**

The Columbian Carbon Company has advanced **George P. Bunn Jr.** from general manager of Mid-Continent Oil and Gas Division to vice president.

Frank O. Prior, board chairman of Standard Oil Company (Indiana) who will retire at age 65 on August 25, will be succeeded as chief executive officer by **John E. Swearingen,** president.

ALLAN FOUST: His new book a jump into complex world of unit operation interrelationships

PROCESS DYNAMICS / Chemical engineering catching up?

One early fall day in 1952, tall, pipe-smoking, chemical engineering professor Allan S. Foust turned in his final report to his summer-time employer. In it, Foust showed how he had predicted the time required to degas metal parts for electron tubes by using a common heat-transfer equation. Foust got his results by merely substituting mass transfer values to make the equation work for the diffusion of gas through porous metal.

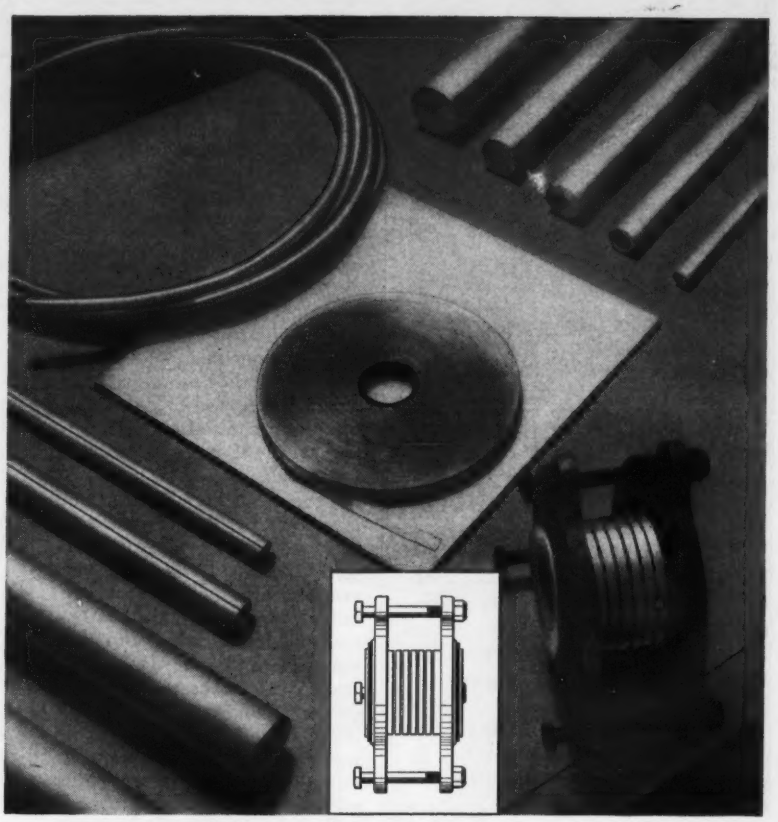
By no means the first to make use of this nevertheless uncommon device, Foust went back to his teaching thinking that by not being taught underlying concepts of unit operations, most chemical engineers are unable to make similar broad use of their much-compartmented techniques. Foust also knew, as many of his time were also aware, that real solutions to tomorrow's automatic control problems will come only through the increasing ability to use these underlying relationships in the design of integrated processing units.

New Text to Rival Walker-Lewis-McAdams?

Last week, eight years after that summer job experience, "Principles of Unit Operations," a king-size book by Foust and members of his staff at Lehigh U.'s Chemical Engineering Dept., was received by a well-alerted profession. For months, the word had been that this new training text would probably carry sufficient wallop to approach the position of esteem held for so long (since 1922) by Walker, Lewis, McAdams still-famous "Principles of Chemical Engineering." Whether the new book will live up to such advance rumor only time will tell.

Outstanding feature of the book is that it makes a wholehearted attempt to jump into the complex world of unit operation interrelationships — without letting itself get more complicated than a junior student, or for that matter a bright but traditional postgraduate, can assimilate if he really tries.

To next page



For resistance to practically everything, specify R/M "Teflon" gasketing and other parts. The complete R/M "Teflon" line includes expansion joints (lower right corner of this illustration), color-coded thin-wall tubing, bondable "Teflon" sheets, etc.

If the spec reads TEFLON,* get the experience of R/M

No need to restate the unique combination of properties that sets "Teflon" apart. You *know* that for certain process-equipment parts nothing else will do.

But *where to get "Teflon" fast* and *who can best meet your specs?*

On both counts, the answer is R/M. A pioneer in the processing of "Teflon" into sheets, rods, tubes, hose, tape and complete machined parts, R/M offers you a *complete "Teflon" service* — a service that can help assure you smooth, long-lasting performance of severely exposed equipment parts.

It will pay you to talk "Teflon" with R/M. Call your nearest R/M district office (listed below) or write Plastic Products Division, Raybestos-Manhattan, Inc., Manheim, Pa.

*Registered trademark for Du Pont fluorocarbon resin

PLASTIC PRODUCTS DIVISION
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BIRMINGHAM 1 • CHICAGO 31 • CLEVELAND 16 • DALLAS 26 • DENVER 16 • DETROIT 2
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Save Water and Power in Condensing Vapors

NIAGARA *AERO* VAPOR CONDENSERS give sustained full capacity in condensing vapors by evaporative cooling with only nominal use of water. You have no problem of water availability, or disposal, or quality, or temperature.

The system is self-contained...no cooling tower or spray pond is required. You save not only the cost of condensing water but also the expenses of piping and pumping, and the cost of water handling equipment.

In the Niagara Vapor Condenser the heat is removed at the rate of input and the cooling effect, directly proportional to the load, is controlled by varying the amount of air passing over the cooling surfaces. Operation is automatic and trustworthy.

Liquids and vapors are always held at constant temperature under close control. You get uniform distillation products the year round. You get better quality and increased production.

Non-condensibles are effectively separated and sub-cooled, giving you better vacuum pump operation. You save power and steam.

Niagara *Aero* Vapor Condensers are manufactured in standard units in a range of capacities up to thirty million Btu's. Write for full information; ask for Bulletin 129-R.

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District Engineers in Principal Cities of U. S. and Canada

Check 3144 opposite last page.

RECENT BOOKS

From preceding page

Foust and associates report they mulled at length over how far to go in combining — or in effect discarding — the unit operations. "We decided that the design departments of the chemical companies will be using 'unit ops' for some time," comments Foust. "So, we decided to go along with them, but concentrate on interrelationships to the degree that the new graduate will be equipped to go on into computer simulation and control work, if he is of a mind to do so."

Other bowing to tradition is shown by the emphasis in the book given stage operations. However, all stage operations are shown to be calculable by the same mathematical model. A more advanced section deals with transport processes — mass, energy, and momentum transport. Here again, a single math model — the Fourier equation — is used to apply equally in all three cases. Boundary layer phenomena are made a part of the new approach.

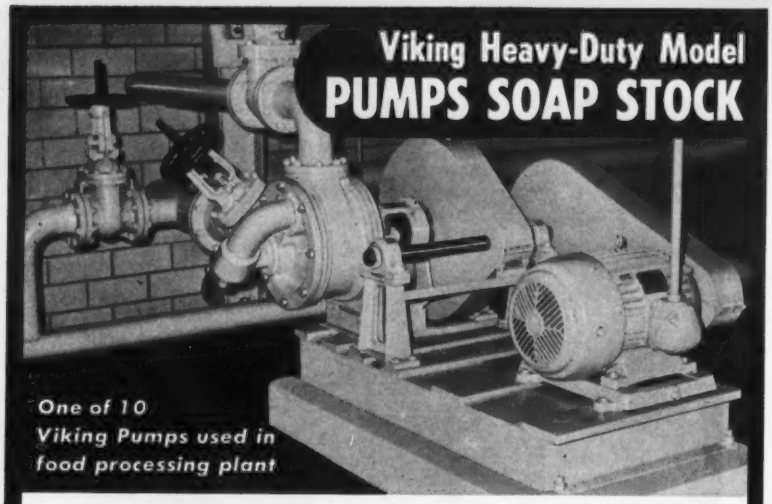
Avoids Empiricism

In attempting to "simplify" the subject by discarding the old empirical assumptions and dealing more with underlying fundamentals, the solutions to design problems had to fall more within a range of probabilities, rather than finite numbers. The growing practice in industry is to use computers for such solutions — unavailable today to most students. So graphical methods were devised and are used.

For the time being, Foust is indicating he and his associates are content to change the pattern of undergraduate thinking about unit ops. Familiarity with computer solutions will come as the student begins rubbing up against them in industry.

"Attitude flexibility" is the answer Foust gives to the question, "What kind of post-graduate chemical engineer could benefit by boning up on the new book?"

A detailed, critical review



Anderson, Clayton & Co. Foods Division, processes Mrs. Tucker's vegetable oil products in its Texas plant. Soap stock is a by-product. As the material has a viscosity of 128,000 SSU, an "M" size heavy-duty, steel fitted Viking Pump is required to move the thick, viscous stock to storage tanks, tank cars and trucks. Plant management states they are well pleased with this pump and the nine other Viking pump units they use in various stages of processing vegetable oils.

Viking Pumps are famous for pumping thick liquids and semi-solids in the food processing, chemical processing and petroleum industries. If you have a thick liquid to pump, Viking will be glad to draw on its wealth of experience to help you solve it. For information, write for Catalogs CCC and MCC.

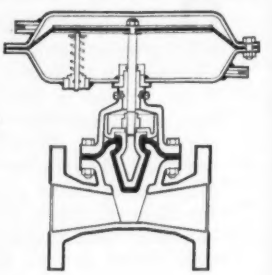
VIKING PUMP COMPANY

Cedar Falls, Iowa, U.S.A. In Canada, It's "ROTO-KING" Pumps
See Our Unit In Chemical Engineering Catalog.

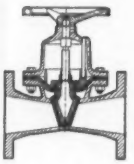
Check 3145 opposite last page.

NEW!

CORROSION RESISTANT PACKLESS DIA-PLUG VALVES



- Available in aluminum, stainless steel, lined cast iron, etc.; sizes ⅜" to 10".
- Reduces valve costs and provides extra safety.
- Self draining even on horizontal line.
- Maintenance cut to minimum. Working parts and plug can be replaced on the line.
- Assures positive closure even if diaphragm segment of the Dia-Plug should rupture due to excessive pressure or misuse.
- Offers excellent throttling characteristics.
- Requires less force to close allowing for use of small and more economical operators, or minimum manual effort.



WRITE FOR COMPLETE DETAILS AND CATALOG.

DIA-PLUG Division of Cryogenics Corporation
500 Terrace St., Meadville, Penna.

Check 3146 opposite last page.

of "Principles of Unit Operations," by Foust, Wenzel, Clump, Maus, and Anderson; Wiley, New York, 1960, 578 pp., ($15), will appear in a forthcoming issue of CP.

"Characteristics of Engineers and Scientists" is a book born from a study conducted by the Bureau of Industrial Relations at the University of Michigan and in which a total of 277 engineers and scientists from 10 companies were interviewed. Author of the 136-page book is Dr. L. E. Danielson, faculty member at the institution.

The book's six chapters discuss differences between engineers and scientists as a group and other sets of employees. Job activities which engineers feel are satisfying and dissatisfying, plus reasons for these feelings are covered. Specific recommendations are given for getting maximum utilization and satisfaction from such employees.

To obtain "Characteristics of Engineers and Scientists" remit $4.00 direct to Bureau of Industrial Relations, The University of Michigan, Ann Arbor, Michigan.

Check 3147 opposite last page.

High pressure chemical plant design and construction is subject of 250-page book. Authored by Harold Tongue, British consulting engineer, this second edition is a thoroughly revised version of the book that first appeared in 1934.

High pressure applications in chemical and petrochemical industries are discussed. Considerable space is devoted to high pressure technology in the nuclear field. Divided into 16 chapters, the book is profusely illustrated with charts, tables, drawings, and photographs.

To obtain "The Design and Construction of High Pressure Chemical Plant" remit $15.00 direct to D. Van Nostrand Company, Inc., Princeton, New Jersey.

Check 3148 opposite last page.

Principles of Chemical Thermodynamics are detailed in 306-page book by Charles E. Reid, University of Florida. Primarily intended as a textbook, the volume stresses principles and makes no attempt to be comprehensive in covering applications. A fresh approach is used to present the subject. For example, entropy is treated postulationally, with no attempt to make it depend on heat engines. A chapter on statistical thermodynamics is also included. Problems are listed at end of chapters.

To obtain "Principles of Chemical Thermodynamics" remit $7.80 (trade edition) to Reinhold Publishing Corporation, 430 Park Avenue, New York 22, New York.

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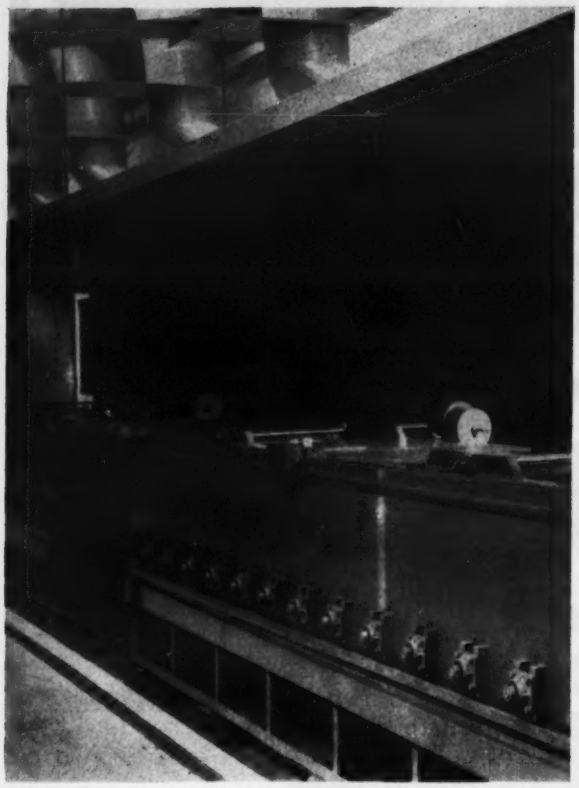
Check 3149 opposite last page

Another new development using

B.F.Goodrich Chemical *raw materials*



Complete acid etching machine of rigid Geon was developed by Industrial Plastic Fabricators, Inc., Norwood, Massachusetts. It is used by Corning Electronic Components, Corning Glass Works, Bradford, Pennsylvania, to produce Fotoform and FOTOCERAM® products like the circuit board shown. B.F.Goodrich Chemical Company supplies the rigid Geon vinyl.

Machine of rigid Geon produces low cost precision etching on glass

"Chemical machining" is the accurate term for the high precision etching on glass done by this new machine. Square-cornered, submicroscopic holes can be produced with small tolerances and close center-to-center distances. Or a precise pattern can be created in glass, whether it involves holes, cut-outs, or channels. Screens with mesh as fine as 560,000 holes per square inch have been produced.

The machine is made of shapes, sheets and rods made of Geon rigid vinyl. Geon is unaffected by the acids that do the etching job. It provides the durability and impact strength needed for fabrication. And it is as easy to handle as any material used for manufacturing.

Here's another example of the way Geon vinyl can open new markets or improve old applications. For more facts, write Department GO-6, B.F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Geon VINYLS

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Check 3150 opposite last page

CORROSION CONTROL
. . . 7th Annual Feature

Mr. Executive: Who's your Corrosion Engineer?

Are you letting the dollars you so carefully conserve by good design engineering, and so meticulously watch through advanced industrial engineering and electronic computation, go merrily down the drain because of inadequate attention to corrosion prevention? If so, why not resolve to stop it! Find out who's doing your corrosion engineering, untie his hands and let him do his job effectively — utilizing the amazing benefits of this new-found science — and get set for some real savings, not only in repair and replacement costs, but through greater continuity of operation and greater pride of your employees in their work.

— G. E. Best

Today's high-investment facilities cannot tolerate unnecessary shutdowns. Stronger corrosives, higher temperatures and pressures and greater velocities pose a stiff challenge.

Corrosion Management: Pivot Point For Plant Success . . . or Failure

GEORGE E. BEST, President
National Association of Corrosion Engineers

INDUSTRY is doing an excellent job of developing techniques in the science of corrosion control—so vital to our national defense and economic progress — but often fails to fully utilize these techniques in solving corrosion problems. The science of corrosion control is making noteworthy progress but management of corrosion is sadly lacking in many companies.

One chemical company built a larger fertilizer plant which literally fell to pieces before it was completely in operation. Reason: lack of attention to corrosion problems. This failure not only delayed the operation of the plant for a long time but seriously impaired the financial stability of the entire company.

In another case, the major problem a plant had with a new commercial process was one of corrosion. The plant did not operate properly for several years because of insufficient attention paid to corrosion.

Protective coatings at another plant failed in a few months because of the selection of wrong coatings for environment encountered or to improper application of coatings.

These costly failures and many similar ones occurred because the corrosion engineer has insufficient status in the companies concerned. Often a plant either has no corrosion engineer at all or he is relegated to a dusty corner. In some plants he is merely an adjunct to the maintenance department.

Frank L. LaQue, Vice President, The International Nickel Company, and a past president of the NACE, brings out this point vividly in his statement in CHEMICAL PROCESSING, July 1956:

"A fair number of corrosion engineers are on the staffs of the firms interested in supplying corrosion-resisting materials, protective coatings and other means of controlling corrosion. There aren't enough of them on the staffs of companies who have the corrosion problems — including many in the chemical and process industries where the economical solution of these problems frequently represents the difference between success or failure of a new process or new product.

"What all this adds up to is the need for a greater recognition by management of the importance of specialized attention to corrosion. This may require one or more corrosion engineers designated and trained as such who will have the confidence and support of management and who will be given sufficient authority to enable them to be effective when important decisions are to be made."

Of course, some chemical processing companies have fine corrosion control programs. In others, however, a great deal more can be done.

Although the largest organization devoted to corrosion control — the National Association of Corrosion Engineers — is growing steadily, it does not receive the support and recognition it would seem to deserve among many companies in the chemical processing field.

Although many scientific societies touch base with corrosion problems, their outlet and scope in this field may be necessarily limited. NACE, for example, is the only technical association on the American continent operating exclusively in the field of corrosion science and control, and its rapid rise from a small group in 1943 to more than 6000 members now attests to its having filled an ever-growing need in relation to general technological advancement. A company can gain much by working closely with this organization.

There is little or no disagreement about the impelling need to control corrosion or the economic consequences of failing to do so. There is, how-

To page 49

GEORGE E. BEST, dynamic new president of the National Association of Corrosion Engineers, intends to battle for greater status for the individual corrosion engineer and the NACE. He knows from his long experience in the chemical industry that corrosion does not receive the attention it would seem to deserve in this vital field.

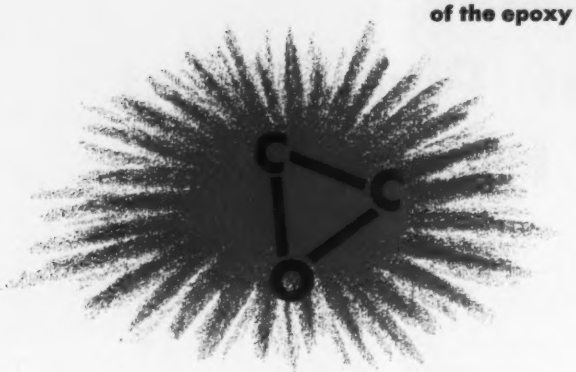
Mr. Best recently joined the Manufacturing Chemists' Association. Before that he was manager of technical services for the Solvay Process Division of Allied Chemical Corporation for a number of years. Previous to that he was with Pennsalt Chemicals Corp. and New Jersey Zinc Co.

Mr. Best has been active in the NACE for many years, having held a variety of offices in that organization.

He is the author of numerous technical papers on corrosion control. He has a BS degree in Electrochemical Engineering from the Massachusetts Institute of Technology.

Versatile technique building new

- **chemically resistant, highly adhesive RESINS**
- **more economical, better PLASTICIZERS for PVC**
- **INTERMEDIATES in which strained configuration of the epoxy ring provides high site reactivity**



Keep your eye on Epoxidation

As told to
JOHN MELLECKER

EPOXIDES . . . organic compounds containing the unusually reactive ring group depicted above . . . are post-war developments which have zoomed to major $$ volume in industrial coatings, adhesives and PVC plasticizer applications.

Because of the high reactivity of the molecule containing epoxide groups, cross-linkage of epoxy resins can be accomplished with a wide variety of agents (commonly primary and secondary amines, organic acids and acid anhydrides). The resulting labyrinth becomes so firmly held together that the resulting polymer is extremely inert. As such, it can withstand heavy chemical attack, weathering, contact with detergents, etc.

Epoxidized fatty acid esters and vegetable oils have found large volume use as plasticizers for PVC. Here the epoxide has two functions: to scavenge HCl degradation product and to add plasticizing qualities to the PVC. There is also an economic advantage. In a typical conventional formulation, 100 parts PVC are blended with 55 parts dioctylphthalate plasticizer and 3 parts stabilizer — which costs $0.50-5.00/lb. Only half as much stabilizer is required if 20 parts epoxide plasticizer are used with 35 parts diethylphthalate.

One of the outstanding qualities of epoxy resins is their adhesive quality in contact with surfaces. Here some of the epoxides actually link with surface molecules, in some cases even forming chemical bonds. Result: Toughest adhesive, even for glass to metal, and unweakened by most exposure.

The same high reactivity makes synthesis of intermediates attractive particularly in the pharmaceutical and synthetic organic chemicals fields.

Expect to see greater activity in his area . . . particularly as epoxidizing costs are reduced.

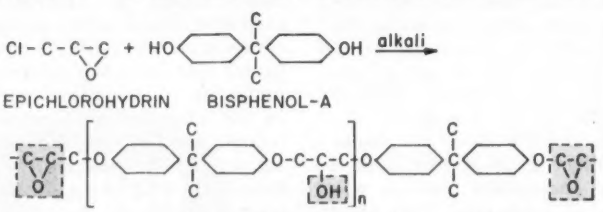
How Epoxidize

Epoxidizing, or introduction of the epoxy ring group into a molecule, is accomplished by selective oxidation of olefines, or by condensation of epoxide-containing molecules.

Largest production of epoxy resins today is by the condensation method. Epichlorohydrin is reacted with bisphenol-A according to the method shown in Figure 1.

Another condensation route, which is largely experimental of today, uses diepoxies. One of these is diglycidyl ether. Another is butadiene dioxide. Both of these materials are used in production of epoxides of special properties. More will be heard about these as time goes on.

Figure 1—Epoxy Resins by the Condensation Method



Note: Color blocks show reactive groups. H's linked to C's not shown.

In the meantime, new and more highly reactive epoxy resins are becoming commercially available. Noteworthy is FMC's Oxiron (1)* family, which has a general configuration shown in Figure 2.

Oxiron resins contain both internal as well as the more conventional external epoxide groups, as well as OH- and for the first time reactive double bonds . . . all highly reactive sites for cross-linking.

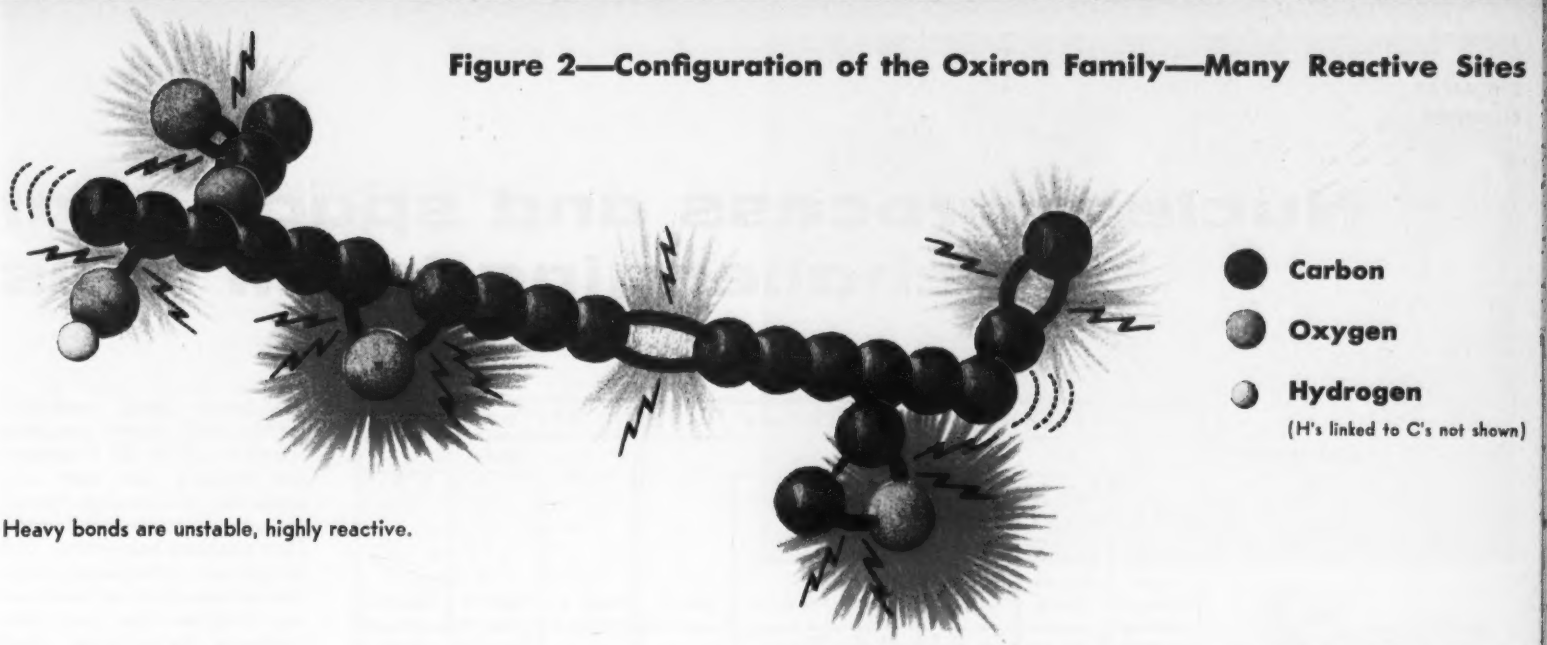
Produced from polyolefins, such as polybutadienes, Oxiron resins represent a new approach to epoxy resin molecular design: selecting and using basic building-blocks to provide optimum end-product qualities plus certain symmetry — all of which encourages cross-linking.

Direct Epoxidation — How and What With

Direct epoxidation of mono and poly unsaturated fatty acid esters and vegetable oils is the reaction-route used by

*Literature references are on facing page.

Figure 2—Configuration of the Oxiron Family—Many Reactive Sites



Heavy bonds are unstable, highly reactive.

the plasticizer industry.

Direct epoxidation is accomplished by reaction of an organic peracid with unsaturated substances. The peracid is usually peracetic formed in-situ from H_2O_2 and HOAc in the presence of an acid catalyst. Unsaturates include olefins (both aliphatic and acyclic), fatty acids and esters, alcohols, fats and oils, terpenes, polymers (such as rubber), sterols and monomers.

Preformed HOOAc prepared from H_2O_2 and HOAc with an H_2SO_4 catalyst found early wide use in spite of known undesirable tendency to open the epoxide ring. Also, 22% of its active oxygen is, under the conditions of use, nonreactive — an economic handicap.

Consequently, much effort was directed at development of in-situ processes whereby epoxidation by direct use of H_2O_2 could be achieved.

First of these used H_2O_2 and HOAc with an H_2SO_4 catalyst (2). Tendency to form by-product monosulfate ester, which discolors the plasticizer on exposure to heat, gave industry some trouble. A new patent (3) appears to end this problem through treatment of product oil with solid caustic for two hours at 50-60°C.

A recent but already widely adopted development is an in-situ system which uses H_2O_2 with HOAc, and an ion exchange resin as catalyst. Both FMC's Becco Division and Du Pont were instrumental in the system's development, now covered by U.S. Patent 2,919,-283 (4), assigned to FMC.

The resin used is a cross-linked sulfonic acid cation exchange type.

Re-use of the resin was seen as highly desirable. When attempted, however, swelling and decomposition into oil-soluble degradation products soon occurred. Research traced the difficulty to presence of heavy metal ions — iron, copper, and nickel.

Three preventive steps make resin re-use practicable: Use of a more highly cross-linked resin (ratio divinylbenzene to styrene 12% instead of 8%); use of 250-1000 ppm of sequestering agents such as polyaminocarboxylic acid; rendering resin initially metal-free by prewashing with mineral acid.

OXIRON RESINS — new epoxy building blocks

Grades: 2000 — High viscosity, for laminating and adhesives, cured by conventional agents. **2001** — Low viscosity, for casting, encapsulation, as well as laminating, adhesives. Reacts similarly to 2000. **2002** — Still lower viscosity. For laminating and casting. Possesses enhanced double bond (vinyl group) reactivity.

All grades have exceptional cross-linking abilities, assuring inertness, chemical resistance. Pot life is longer if cured with polyamines. Some systems cured at room temperature.

Superior flexure strength and other physical properties are shown after exposure to high temperatures. Where castings of ordinary epoxy resins are embrittled after 250 hr at 150°C, Oxiron 2000 cured with polyamine showed strength loss of only 40% after 720 hr at 150°C.

Availability: Experimental (to one drum) quantities.

Processes involving re-use of resin use either a fixed bed of resin through which oil-H_2O_2HOAc mixture is pumped, or in batch techniques. With a resin bed of 8-10% (wt) (based on combined total HOAc and H_2O_2), from 12-15 cycles of resin are possible. Operating conditions are 5-6 hr at 60-65°C. If resin degrades, however, removal of decomposition product from oil is difficult.

Processes using resin a single time, after which it is discarded, offer advantages of using same equipment as designed for H_2SO_4 process, but require slightly more drastic conditions. Here, resin is maintained in suspension in reactants for 7-8 hr at 75-80°C, and then is filtered from solution when reaction is completed.

Future reaction systems will include continuous columns, through which oil will rise, H_2O_2 will counter-currently fall, and HOAc will enter the column uniformly along its height, to avoid epoxide-group-endangering concentration.

A limiting factor in design of packed columns is removal of heat. Reaction is exothermic. Normally, reactants are slow-moving, calling for use of jacketing and careful attention to packing diameter.

Economics

Direct, in-situ processes using H_2O_2 depend on availability of H_2O_2 in high (50%) concentration at a moderate price. First peracetic acid process was made possible by the favorable H_2O_2 avaliability

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5) Palmer, T. W. and Hart, A. W., Chem. Proc., p. 32, March 1960.

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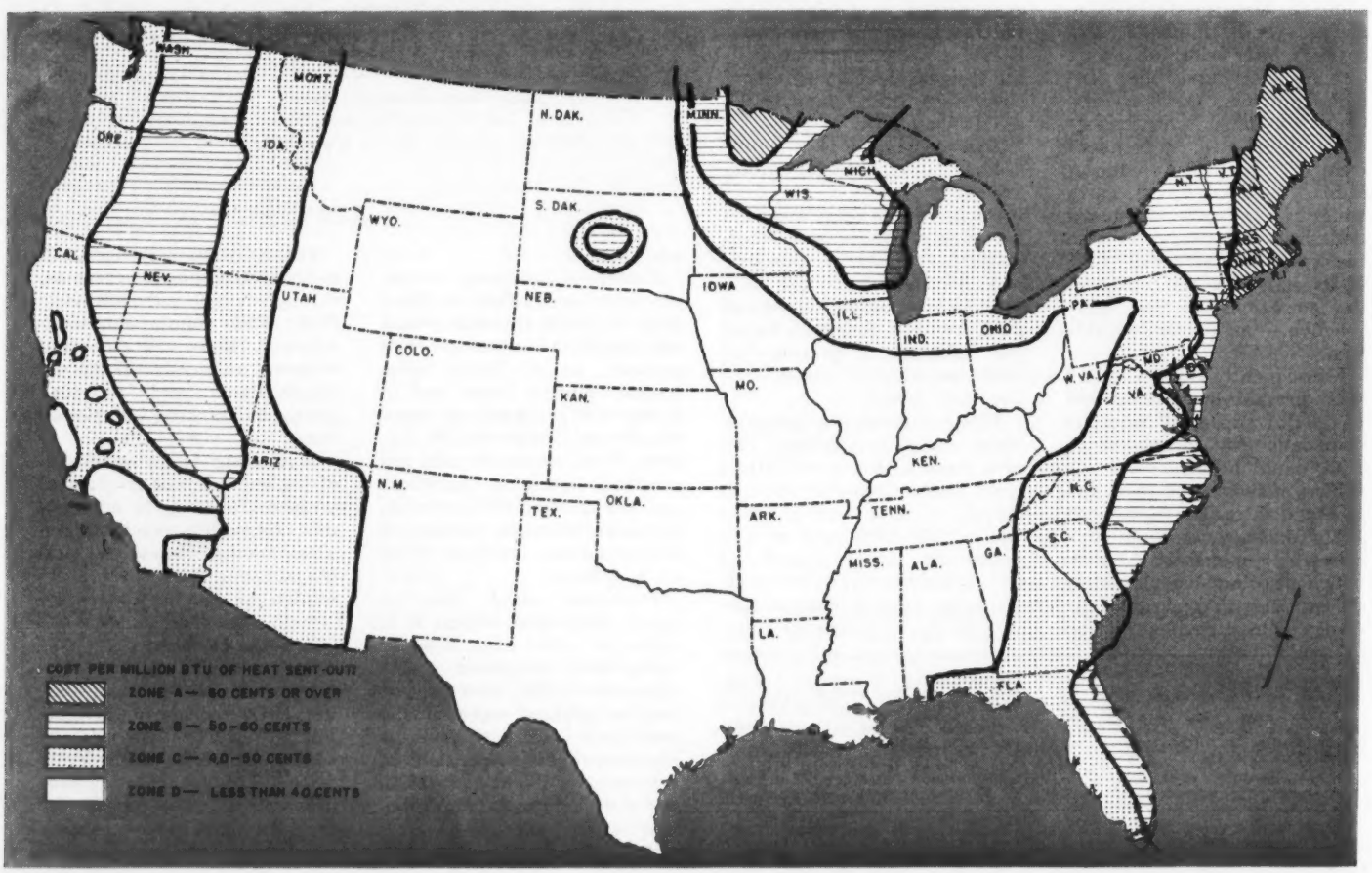
Nuclear process and space heat challenging fossil fuels

	NUCLEAR			COAL			OIL OR GAS		
Total Fixed Costs	54c			30.6c			20.4c		
	Fully Enriched Fuel Elements	Partially Enriched Fuel Elements $12. Pu Credit	Partially Enriched Fuel Elements $30. Pu Credit	Zone A	Zone B	Zone C	Zone A	Zone B	Zone C
Total Fuel Costs	48.8c	34.0c	23.0c	60c+	50c+	40c+	60c+	50c+	40c+
Total Cost Per 10^6 Btu Delivered Heat	102.8	88	77	90.6	80.6	70.6	80.4	70.4	60.4

Cost comparisons of 20-megawatt plants operating at 80% load factor

A recent study conducted for the AEC reveals that some segments of the U. S. chemical industry can now economically use nuclear energy for process and space heating. Cost analyses have shown that in certain geographic areas nuclear operation already has an economic edge over conventional fuels. Rising fossil fuel costs, coupled with advances in nuclear technology, may soon widen the gap even more and extend the economic advantage into other locations

Heat cost variations in the U. S., using fossil fuels



Study shows it's competitive for 172 U.S. CPI plants now, may soon gain edge for another 372

of the United States as well.

In the study, made by American Hydrotherm Corporation, Long Island City, New York, the country was divided into four major zones (see map). Total "send-out" cost of heat (using fossil fuels) was calculated for each area. Send-out heat costs were derived from delivered fuel costs and boiler plant efficiencies of 78% for oil- and gas-fueled systems and 76% for coal-fueled systems.

Studied 1270 Chemical Plants

Some 20 categories of industrial heat users were investigated in these areas. Total number of installations was 4755. Of these, 1270 were classified as chemical and allied industry plants, and the number of these plants in each of the three highest fuel cost zones being: A—172, B—372, and C—726. All of the installations used in excess of 30,000 lb steam per hr.

Minimum size reactor considered suitable for use in these installations is a 20-megawatt (about 60 million Btu per hr) boiling-water type unit. Comparative costs per million Btu (basis 80% load factor) for nuclear and conventional-fired heating plants of this capacity are tabulated in the accompanying chart.

It can be seen that on the basis of slightly enriched fuel elements with $12.00 per gram plutonium credit, a nuclear plant is immediately competitive with coal-fired plants in Zone A. Rising prices of fossil fuels alone might soon make Zone B competitive too.

The design of a typical 20-megawatt reactor heat plant would be as follows: The reactor core would be located in a 4½-ft-diam by 15-ft-high pressure vessel. The unit would have 88 fuel elements — each with 24 fuel plates separated by coolant channels. Fuel plates would be clad with an aluminum alloy which could provide full-power operation (at 80% load factor) for a two-year period.

This would produce about 40 percent fuel burnup, the expected maximum obtainable for this type of element. If longer core life were desired (as a result of lower plant load factor), cladding thickness could be increased.

Such a unit could generate 450°F saturated steam at over 400 psi. This would be sent direct to main heat exchanger. Here it would be condensed and cooled, while heating a secondary heat-transfer fluid from 200°F to maximum of 400°F.

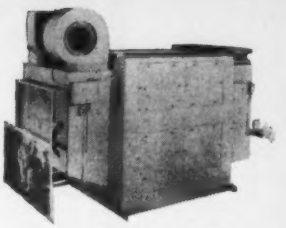
The entire reactor core, heat exchanger, operating and safety auxiliaries would be housed in a vessel 50 ft diam by 75 ft high.

Total cost for such a 20-megawatt boiling water reactor is estimated at $1.9 million. The price would undoubtedly drop after a few plants had been built — probably down to about $1.7 million. Anticipated operating life for such a plant is 30-50 years. Labor force would be approximately 12 persons.

Minimum insurance coverage set by AEC is $150,000 per thermal megawatt. Thus for liability coverage the 20-megawatt unit would require a coverage of $3 million — and an annual premium of $20,000.

(Based on AEC report NYO 2332, "Potential Applications of Nuclear Energy for Process and Space Heat in U. S." Copies of the complete report may be obtained by remitting $2.75 to Office of Technical Services, Department of Commerce, Washington 25, D. C.)

Tableting machines don't clog when workrooms are desert-dry

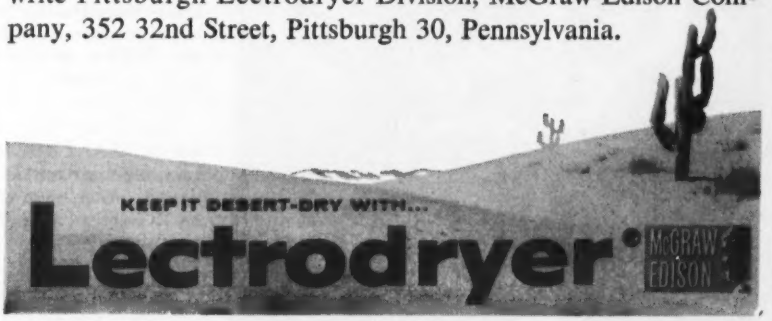


New Type CH Lectrodryer

A CHO Lectrodryer maintains the 15,680 cubic foot area of this tableting room at 20% relative humidity, regardless of conditions out-of-doors. So, when humid weather ordinarily causes hygroscopic powders to gum up and stop flowing, production is maintained here at full speed.

Have you, in the past, considered controlled dryness and found it too costly? It may pay to reopen those files and ask Pittsburgh Lectrodryer for drying recommendations. Dehumidification methods and efficiencies of dryers have been developed so much recently that the cost picture may be completely changed.

DATA SHEETS ARE AVAILABLE which describe typical humidity control installations. They'll serve as guides in planning your own systems. For copies and for other drying help, write Pittsburgh Lectrodryer Division, McGraw-Edison Company, 352 32nd Street, Pittsburgh 30, Pennsylvania.

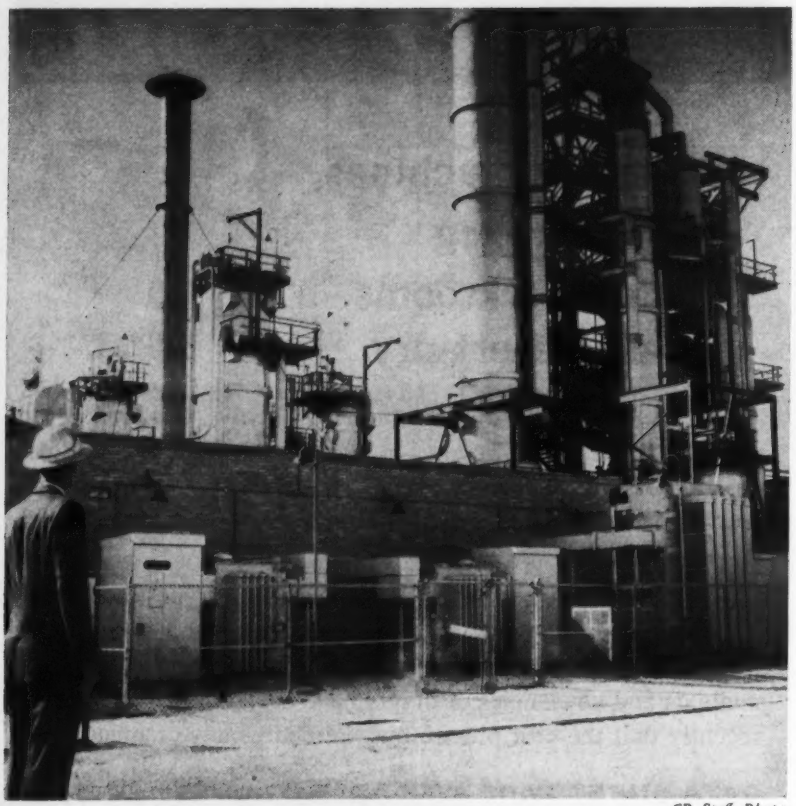


Check 3041 opposite last page.

Planned power distribution system keeps $80 million petrochemical plant on stream

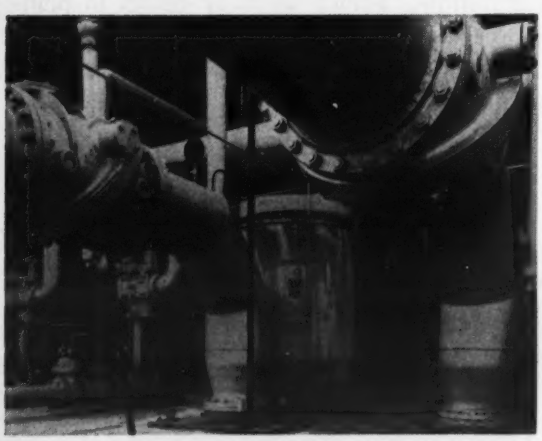
Dependable, uninterrupted service assured through use of four feeders into plant, adequate voltage that gives constant power under varying load and all of latest features in substations, motors and switchgear

GORDON WEYERMULLER, Petrochemical Editor
with **J. B. BOULET,** Electrical Engineer
Petroleum Chemicals, Inc., Lake Charles, La.



CP Staff Photo

▲ Ethylene plant substation, with transformers outside and pressurized building behind them. The two 750-kva transformers are at left and 7500-kva transformer is at right



◀ Large vertical, 450-hp induction motor, operating on 2300v, drives pump that circulates 9000 gpm of cooling water from cooling tower in background through various exchangers. Pump has 70-psi discharge

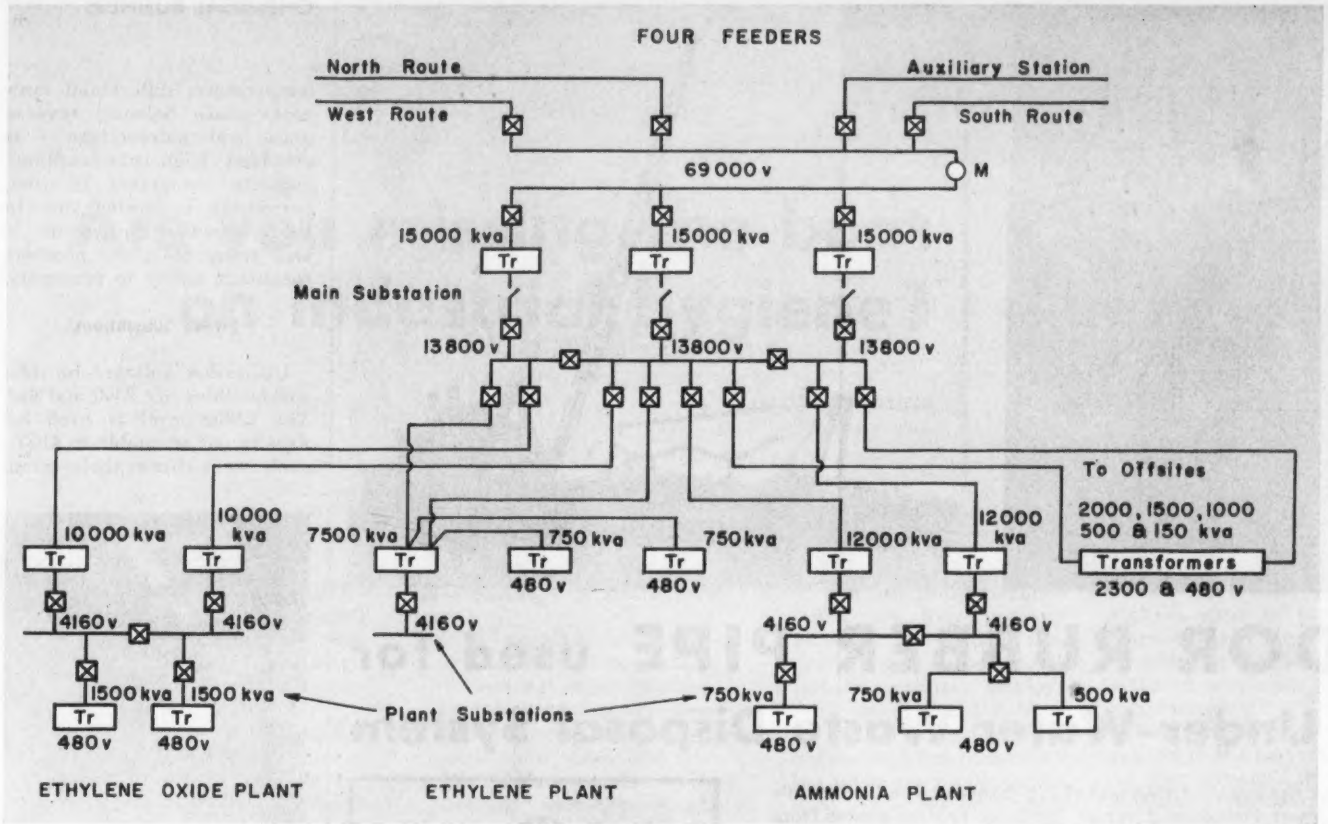
Electrical power distribution system of Petroleum Chemicals, Inc. is considered to be a near ideal system, principally because it was planned carefully as an overall integrated unit with consideration of the relation of each of three plants to the others and to the whole system. An adequate power system was provided, which insures dependability of service, provides certain operating economies and allows room for future expansion.

Power, which is furnished by Gulf States Utilities Company, comes into plant at 69,000 volts through four feeders from three independent sources. Any one of these feeders is capable of handling the entire plant load in an emergency.

The main substation has three 15,000-kva transformers, with fan- and forced-oil-cooled rating of 25,000 kva each. Since the total load at present is 42,000 kva, ample capacity is provided. At this substation, voltage is reduced to 13,800v for distribution to plants. Main substation (69,000v equipment)is outside of plant area and is operated by Gulf States Utilities Company. The 13,800v portion of the main substation is owned and operated by PCI. Individual substations for transforming the 13,800 voltages to lower voltages, located adjacent to each of plants, are also owned and operated by Petroleum Chemicals.

From main substation, two feeders go to each of the three plants — ethylene oxide, ethylene and ammonia. Of two feeders at each plant, each one is fed from a separate bus for flexibility and reliability of service. If a bus or transformer were to go down, only one-half of one plant would be lost and probably less than this because of spare capacity.

All power cables are placed



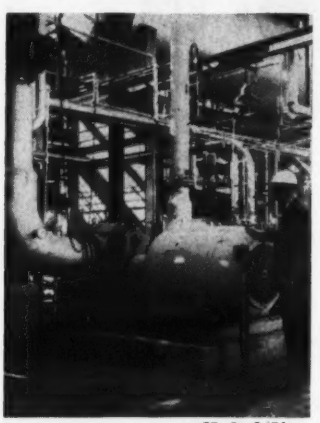
Electrical distribution system at Petrochemical Chemicals

underground in Transite ducts to avoid need for overhead clearance and improve safety. Cables (13,800 and 4160v) are paper insulated and lead sheathed, making them water tight and protected. Splicing and maintenance are done in manways located at strategic points.

Ample Power Capacity

One of the main advantages of ample power capacity provided is that any of nine 3000-4000-hp motors can be started across the line without a disturbing voltage drop at the start. Voltage drop is only about 5% on the 13,800v system upon starting a 4000-hp motor.

Ample power capacity also cuts line loss and lessens voltage variation. Distribution at 13,800v and utilization at 4160v, with short secondary feeders to point of use, assures constant voltage source



CP Staff Photo

Motor used to drive blower handling hydrogen to acetylene converter

under varying load conditions.

System power factor of 95% is realized by using large synchronous motors along with other induction motor load. With load center systems, all the advantages of modular design — such as flexibility, reliability, simplicity and economy — are obtained. Neutral grounding improves reliability of system by reducing transient overvoltage experienced in ungrounded systems.

Main Substation

The 13,800v main substation consists of outdoor metal-clad switchgear. The switchgear units are rated at 750 mva interrupting capacity equipped with interchangeable air circuit breakers for incoming lines, bus ties and feeder breakers.

Kilowatt-demand and kilowatt-hour metering are provided on each feeder section for distributing billing to the individual plants. Bus differential and overcurrent protection are furnished. Switchgear is in three bus sections, each section being fed by an incoming line and tied together by a bus tiebreaker. Fact that system is designed to operate with bus ties closed further reduces voltage drop normally realized upon starting 4000-hp motors.

Plant Substations

Since individual plant substations are located near hazardous areas, switchgear is housed in pressurized buildings. This prevents hydrocarbons from entering building. Uncontaminated air for pressurizing is pulled from 30' above the ground through suction stacks.

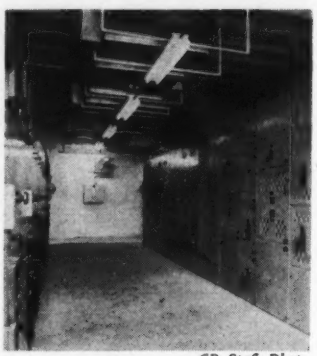
Double-ended substations are fed by two transformers. Utilization voltages of 4160 and 480 volts are used for motors at each plant. Lighting and electronic instruments are fed from 120v dry-type transformers, which are fed from emergency generators upon power failure.

Among features incorporated in switchgear are modular design, adaptable to expansion due to load growth. Air circuit breakers are drawout-type, operated by 125v DC. Adequate circuit and equipment protection — for overcurrent,

temperature, differential current, phase balance, reverse phase and undervoltage — is provided. High-interrupting-capacity equipment is used, permitting expansion due to load growth. Equipment is easy to maintain and provides maximum safety to personnel.

Offsite Substations

Utilization voltages for offsite facilities are 2300 and 480. The 2300v level is used for drivers not adaptable to 4160v, such as submersible-pump



CP Staff Photo

Switchgear is housed in pressurized building to eliminate need for explosion-proof equipment here

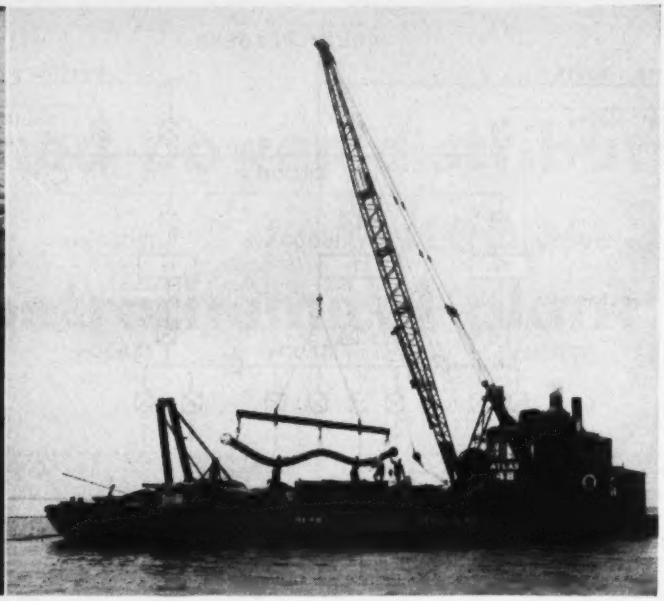
drivers. Outdoor substations are used here because size did not economically justify housing in pressurized buildings. Substations in hazardous areas are equipped with oil-immersed combination starters and air circuit breakers housed in explosion-proof enclosures.

(For further information on plant substations, motors, and switchgear contact Westinghouse Electric Corporation, Three Gateway Center, Pittsburgh 30, Pa.)

Check 3043 opposite last page.

(Ethylene and ethylene oxide plants were engineered and constructed by The Lummus Company, 385 Madison Avenue, New York 17, N. Y.)

For more information on developments in this section, check the Reader Service Slip.

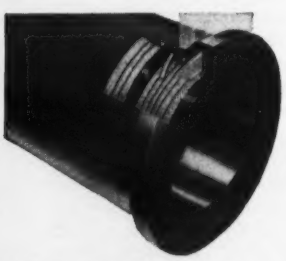


CONDOR RUBBER PIPE used for Largest Under-Water Waste Disposal System

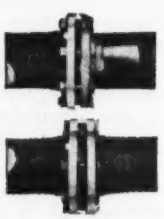
A large chemical plant has installed 1864 feet of 12″ diameter Condor Flexible Rubber Pipe in the lower Delaware River to discharge process wastes from shore to the river channel. Condor Rubber Pipe provided flexibility to permit bolting 50′ lengths together on the deck of the dredge and laying them into a trench in the river bottom. This was easier than bolting or welding a metal pipe-line under water . . . and the rubber pipe will last longer than metal against salt water corrosion outside; nitric and sulfuric acid wastes inside.

Condor Flexible Rubber Pipe outlasts steel 3 to 10 times. It is made in types to withstand pressures up to 250 psi. Installation is easy, economical—and there's no danger of leaky joints at pipe bends. New Hydro-Lok built-on flanges offer full sealing surface *plus* advantage of sure alignment and easy rotation of pipe to equalize wear—*without* removing flange bolts.

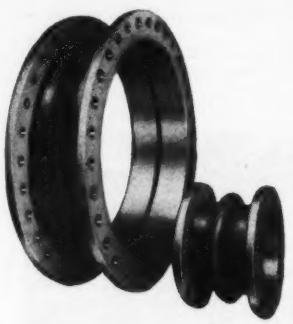
Let an R/M representative give you details on Condor Flexible Rubber Pipe . . . or write today for Bulletin 7152.



- Steel Pressure Ring molded into Hydro-Lok Flange
- Thick, corrosive resistant tube
- Multiple plies of heavy duck
- Reinforcing spiral of steel spring wire
- Tough durable cover



Hydro-Lok Flanges may be used with equal ease to couple rubber pipe to iron pipe with standard flanges (top) or existing sections of rubber pipe using other flanges.



R/M RUBBER EXPANSION JOINTS

- Overcome Pipe Expansion Stress
- Avoid Piping Misalignment
- Resist Abrasion and Corrosion
- Offer Maximum Resistance to Shock
- Require No Gaskets

RM 1008

RAYBESTOS-MANHATTAN, INC.
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

RM

ENGINEERED RUBBER PRODUCTS ... MORE USE PER DOLLAR

Check 3042 opposite last page.

Are you missing the boat on industrial hygiene?

A dollar-saving morale-boosting MUST for every chemical firm is the prevention of occupational disease. A good industrial-hygiene program is the first line of defense in any such effort

GEORGE BANGS
Assistant Editor

Many in the chemical industry have been reaping great rewards from the marriage of medicine and engineering that spawned industrial hygiene.

In an increasingly complex industry, good employee health —with the resulting low absenteeism rate—is essential to economic operation. Accordingly it behooves chemical companies to do everything in their power to prevent occupational disease. Naturally the individual employee's morale receives a tremendous shot in the arm from the knowledge that the company is doing everything in its power to make his place of work as healthy as is humanly possible.

Industrial hygiene is considered the first line of defense against occupational disease. It involves the detection of health hazards, the measurement of concentrations or intensities of hazardous agents, the evaluation of the exposure with respect to standards of permissible exposure, and the engineering control of hazardous operations.

Many in CPI Fall Short of Mark

In spite of the factors outlined above, many firms in the CPI have no industrial-hygiene program at all; more still pay only lip service to the ideal with efforts woefully inadequate to meet modern needs. How does your firm stack up? Answering the following questions should give you a good idea:

1) Are hazards to health controlled as well as hazards to personal safety? For example, has a survey been made of noise exposures in your plant? Over five million dollars in claims for hearing losses have already been filed against a large manufacturer in the state of New Jersey. Have preplacement audiograms been obtained on all employees? Without such audiograms you may be in a difficult position to disprove allegations that hearing losses have been caused by noise exposure in your plant, rather than in the plant of a previous employer.
2) Are the toxicity and precautionary handling procedures of all products handled by your company reviewed constantly?
3) If you are using radioisotopes, are they properly handled? Is a proper records-keeping system in effect on pertinent employees? The potential liability for radiation injury is a serious problem because all too often no provision for such injury has been made under workmen's compensation statutes. Some companies are considering the establishment of a special fund to cover any out-of-pocket costs for radiation-injury cases.

Setting up A Good Program

Industrial-hygiene programs are usually initiated by hiring one man with broad experience and knowledge in the recognition, evaluation and control of stresses in the work environment likely to impair health. Additional personnel—skilled in certain basic disciplines such as engineering, chemistry and physics — may be added to the staff to form a team of specialists in health maintenance.

Staff requirements cannot be related to the amount of capital investment in process equipment. An operation costing a few thousand dollars may give more trouble from a health standpoint than one costing several million. Nor can requirements be related to company population; the bulk of employees may be office workers, or only small selected groups may be potentially exposed to occupational hazards.

In setting up a program, the company must first determine how complete it is to be. If the aim is to prevent all cases of occupational disease, then the following minimum program is recommended:

1) **Have a base-line study made of operations to determine present occupational health conditions.** This should be done by industrial hygienists experienced in the detection, measurement, evaluation and engineering control of hazardous physical and chemical agents. The newly hired industrial hygienist can do this. Or services of consultants, the state health department or nonprofit organizations (such as the Industrial Hygiene Foundation of the Mellon Institute in Pittsburgh) can be used. *To page* 106

How does your plant measure up?

- ☑ Are hazards to health controlled as well as hazards to personal safety? For example, has a survey been made of noise exposures?
- ☑ Are the toxicity and precautionary handling procedures of all products manufactured or purchased reviewed constantly?
- ☑ If radioisotopes are used, are they properly handled? Is a proper records-keeping system in effect on pertinent employees?

A dramatic lesson in what can be accomplished through customer/equipment supplier teamwork

How Du Pont Streamlined Neoprene Bagging

. . . to meet bounding production without adding to labor force

DANA B. BERG, Executive Editor
with **EDWARD D. THOMASSON,** Project Engineer
and **ARTHUR RICE,** Building Supervisor
Neoprene Works, E. I. du Pont de Nemours & Co., Inc.
Louisville, Ky.

Problem: As production mounted at Du Pont's Neoprene Works in Louisville, Ky., it became apparent that established methods of packaging and palletizing would be extremely inefficient — especially in terms of manpower allocation and utilization. Already the plant had gone to use of disposable cardboard pallets and lift trucks with side-shifting attachments (CHEMICAL PROCESSING, July 1958, page 175), but this move solved only part of the problem.

Du Pont had designed and built their own bagging equipment to handle the chips of neoprene. At that time they could not find any standard machine to meet their needs. While it did the job satisfactorily at first, the equipment could not efficiently keep up with the mounting production. Every filled bag had to be check-weighed; pallets were still manually loaded, requiring the services of one man and part-time help of another.

Solution: Beginning in 1957, Du Pont's engineers worked with suppliers of handling and packaging equipment on application and adaptation of standard equipment to the modernization problem. By late 1958 they had what they wanted and had put a total of six efficient lines into production.

All lines are the same except that two of them — used as standby and for special-lot bagging — do not have an automatic bag palletizer at the end of them. Each line has a capacity of seven 50-lb bags/minute.

Neoprene chips, measuring about 1½" long, 1" wide and about ¼" thick, are elevated from knife cutter to bagging machine hopper by a Carrier vibrating conveyor. Powdered talc is introduced into the conveyor and the vibrating action provides even coverage of the neoprene surfaces by the talc; this prevents chips from sticking together later on. Excess talc is removed, screened and recycled.

Bagging is done with a Bemis-Way scale equipped with a bag-holder shaker mechanism to prevent the neoprene from bridging in the bag-holder hopper and to assure a well-filled-out, properly shaped bag. Scale bucket is set to deliver a 50-lb charge by gravity to bag. The bucket is filled by direct bulk flow up to about 49 lb. Then dribble or trim feed, by vibrator, takes it up to an even 50 lb.

A Vee-Trof conveyor takes filled bag upright through sewing machine, after which bag tips over onto a Carrier vibrating conveyor which finalizes shape as it moves, bag-top up, under an RCA metal detector. Presence of even minute particles of metal can be very detrimental in rubber-industry processing operations.

Any tiny pencil-tip piece of metal, even in the center of the bag, will distort the electrical field across the inspection area. A warning horn then sounds and the vibrating conveyor stops until the culprit bag is removed and the circuits reset.

Bag Palletizer

Next — on the four main lines of the six total — is the bag palletizer. This is the first application of this particular unit. Du Pont personnel worked very closely with the supplier in the design of it.

One big advantage of this palletizer is that it can be easily programmed to pattern bags in any way desired — without the need for any special pre-palletizer positioning on the bagging line. Du Pont stacks the bags on a disposable paperboard pallet, with tops all facing inward.

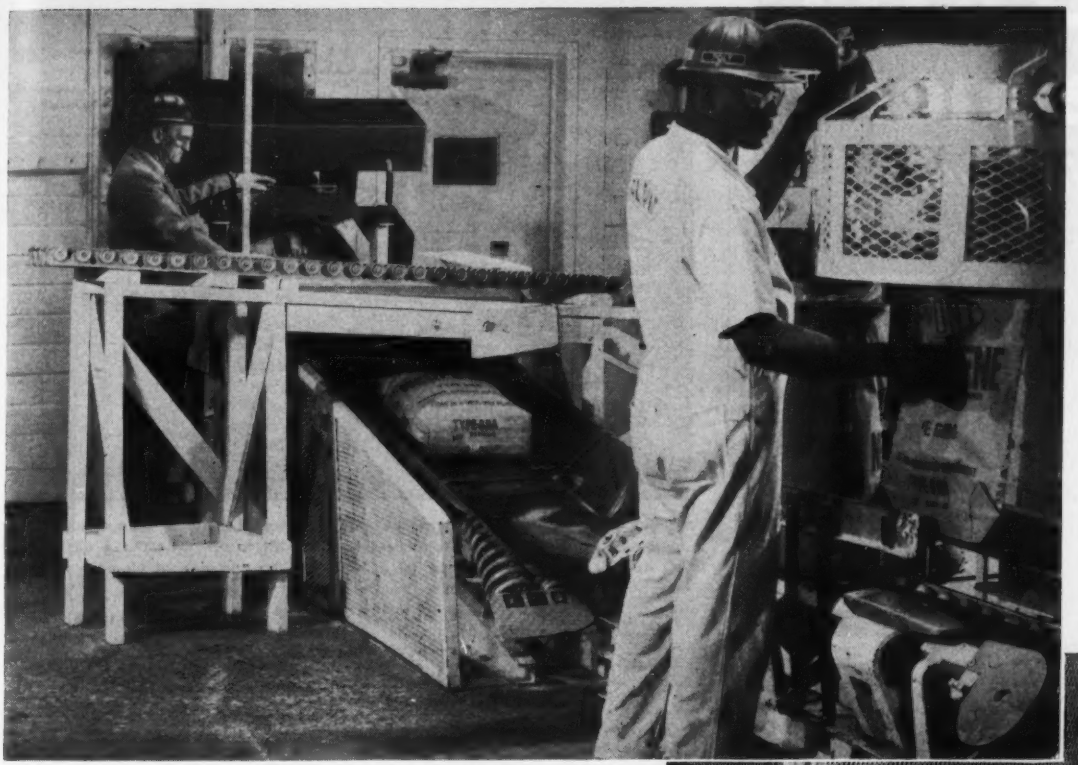
Making this possible is a roller section atop palletizer that elevates certain bags, according to program, turns them through 90 or 180°, and sets them down again on driven-roller section that leads to roller section on which layers are formed. This latter section moves horizontally according to program so that bags flow onto it directly into position.

When layer has been formed, roller section slides out from under, and the bags, in stacking pattern, gently drop onto previously formed layer (or direct onto pallet if this is bottom layer for pallet) which is supported by table that descends one bag thickness as each layer is built up.

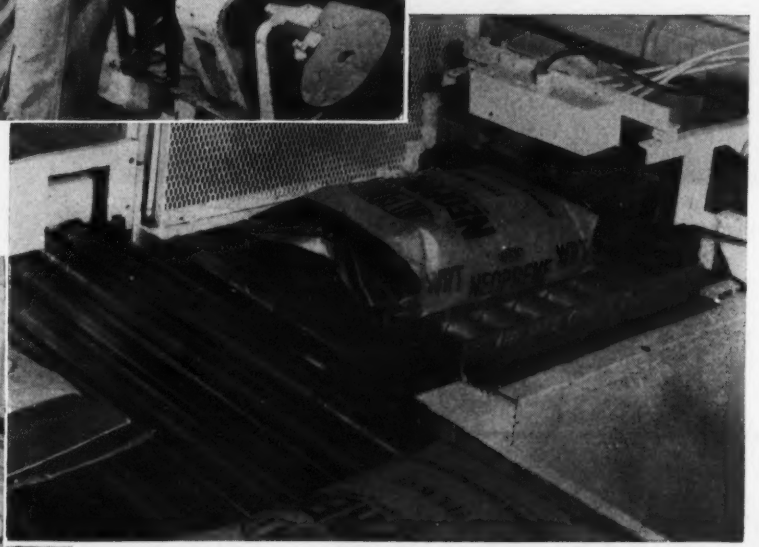
After eight layers have been stacked, pallet load is pushed out of palletizer, onto driven-roller conveyor that carries it away to point where it is picked up by fork-lift truck. Inside palletizer, an empty pallet is automatically positioned on table, which then elevates itself to be ready for catching first layer being formed at the same time.

Static Controls Used

Each palletizer is under control of a Cypak system of static switching circuits. This method was chosen because it has less chance of failure, since it is a low-loss, low-energy system with only static non-moving parts (magnetic



Bags are filled at right, move left through sewing station, and then fall, top up, on vibrating conveyor and bag flattener which carries them under metal detector in background. Automatic palletizer is next in line, beyond wall

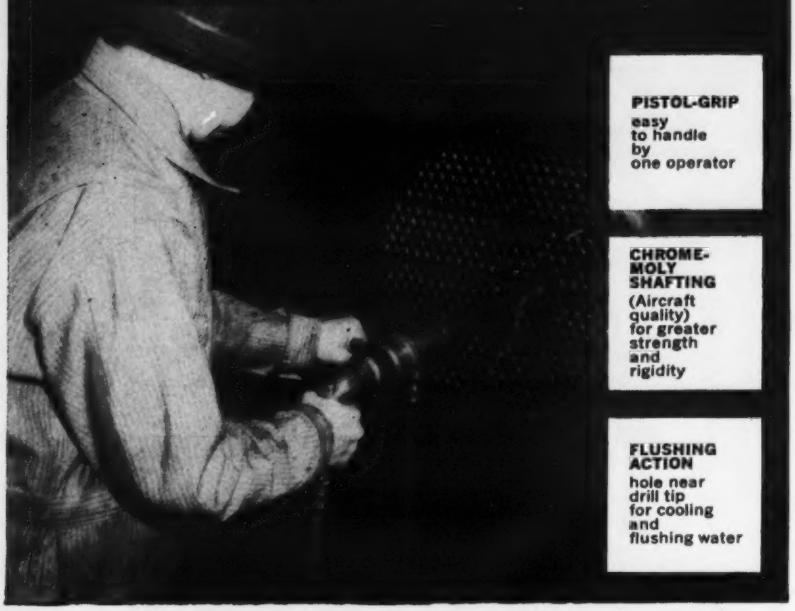


Top of automatic palletizer. Bag layers are formed on roller section at left. Bag at right has come up from bagging operation, is resting on square roller section that rises, as programmed, and turns bag through 90 or 180° so that stacking is done according to pattern plan

When eight layers have been automatically palletized, pallet-load is pushed out onto driven-roller conveyor that takes it away to point of pickup by fork-lift truck

newest ELLIOTT tube cleaner

lightweight! air-driven!



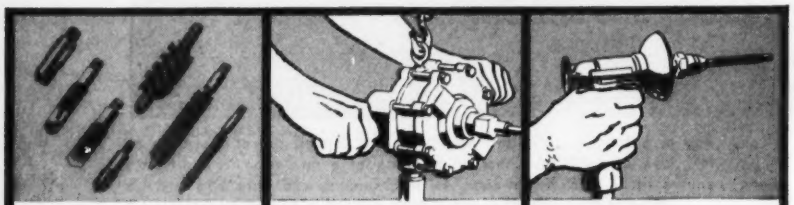
PISTOL-GRIP easy to handle by one operator

CHROME-MOLY SHAFTING (Aircraft quality) for greater strength and rigidity

FLUSHING ACTION hole near drill tip for cooling and flushing water

for condenser and heat exchanger tubes

Lightweight. Powerful. Air-driven. Trigger-action control with speed governor to prevent shaft-whip. High-speed motor reduced through planetary gears to 1500 rpm. Integral water-feeding attachment with finger-action valve which controls flow of cooling water into hollow shaft and drill or brush. Built-in oil reservoir. Send for tube cleaner bulletin Y-48.



DRILLS AND BRUSHES FOR VARIED NEEDS
Brushes for light deposits. Four types of drills clean light, hard-heavy, hard-light, and gummy deposits.

SUSPENSION TYPE
Air, steam or electric heavy-duty motor, for removing hard, heavy deposits. Ball bearings absorb thrust in either direction.

ELLIOTT JIFFY GUN
For extra-fast cleaning of light deposits in tubes ½ in. to 1¼ in. Air or water pressure shoots nylon brushes or rubber plugs through tubes.

ELLIOTT Company
Lagonda Plant—Springfield, Ohio

V5-1

Check 3044 opposite last page.

Neoprene Bagging . . . . *From preceding page*

Graphic proof of neater appearance and improved stability of pasted-bottom open-mouth bag (right) is shown here—in contrast to older type bag on left. The new bag permits identification of neoprene type to be put on both sides and both ends, and lot number to be stamped on bottom of bag, which is always stacked to be facing outside so as to be visible

cores, metallic rectifier diodes, resistors, etc.).

Bag Change

The plant has recently converted to a pasted-bottom open-mouth bag, similar in appearance to a jumbo grocer sack except that it is sewed shut at the top (May 1959 CP, page 54). It has straight sides and rectangular bottom construction, and is surface-treated with "Ludox" colloidal silica which aids in reducing slippage. Du Pont finds these bags stack with more stability and have less tendency to tear open since there are ears on one end only and this end is palletized inward. Previously it was a too common occurrence to have the bag ears catch on things while being moved, ripping open at these points. Customers have expressed pleasure in the easier handling and neater appearance of the palletized loads of the new bags received from both Louisville and Montague, Michigan, plants.

These bags are supplied by Union Bag-Camp Paper Corporation, West Virginia Pulp and Paper Company, and St. Regis Paper Co.

Results: Bagging and palletizing operations for all six lines, in three-shift operation, now requires a total of 34 men . . . releasing a substantial number of men for more productive activity. All told, Du Pont figures this means a saving of more than 50,000 man-hours every year.

One man, at the bagging machine, can handle actual operation of each line. Accuracy of weighing is now such that checkweighing can be done on complete pallet loads. Each pallet is weighed on conveyor, and weight printed on tape.

(Bemis-Way scales, shaker mechanisms and Vee-Trof conveyors were supplied by Bemis Bro. Bag Co., 408 Pine St., St. Louis 2, Mo.)

Check 3045 opposite last page.

(Bag palletizer is product of Miller Engineering Corporation, 119 E. Barbee Ave., Louisville 8, Ky.)

Check 3046 opposite last page.

(Metal detector is a development of Inspection and Control Section, Radio Corp. of America, Camden 2, N. J.)

Check 3047 opposite last page.

(Cypak control system supplied by Westinghouse Electric Corp., Three Gateway Center, Pittsburgh 30, Pa.)

Check 3048 opposite last page.

Radioactive 'go-devil' speeds pipe cleaning, has safety device

Source returns to lead pot if line pressure drops

Problem: Many industries clear the inside of pipelines with a tool called a "go-devil". Cylindrical in shape, the device fits into pipes and carries brushes or scrapers which scrub inside of pipe as the line pressure forces the tool through the pipe.

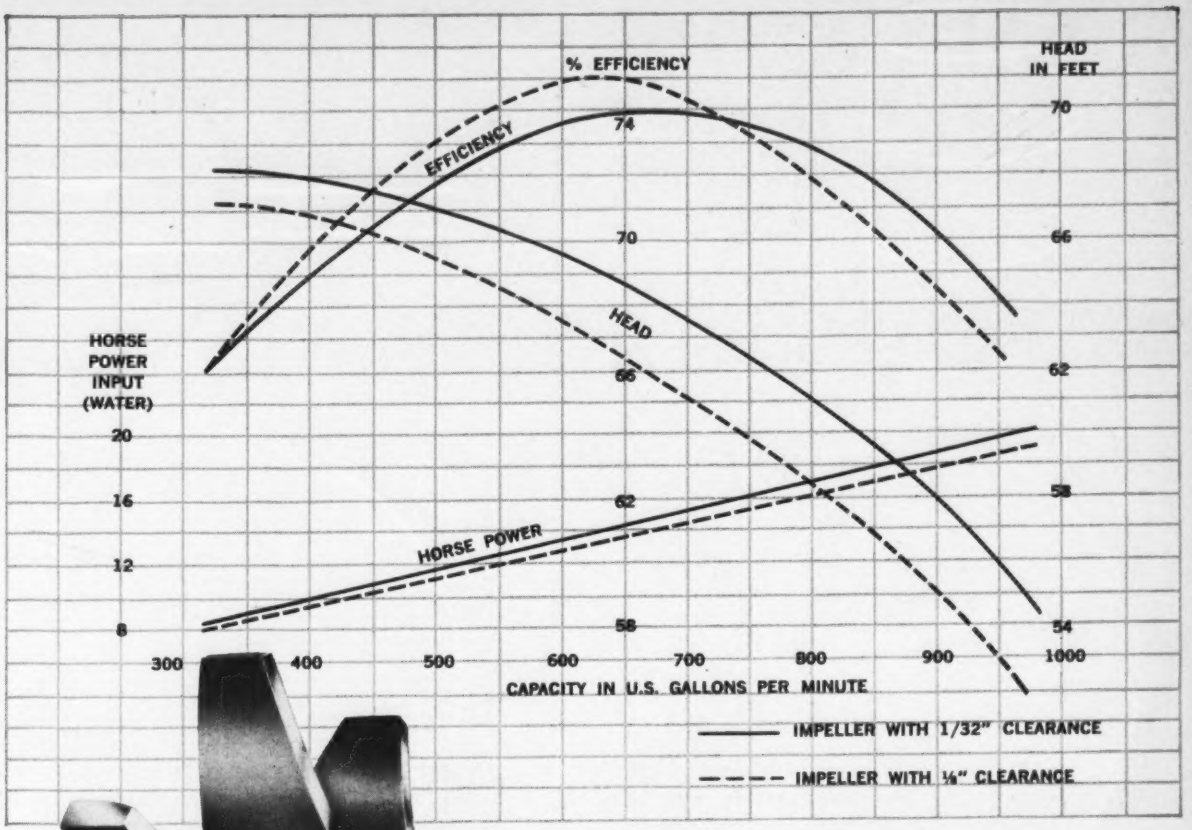
Sometimes these devices jam and it becomes difficult to locate them — especially when the pipe is buried. To make precise location easier, a radioactive source can be installed inside the go-devil. However, to find the tool when it is jammed in a pipe under several feet of earth requires a source which has a fairly high level or radioactivity.

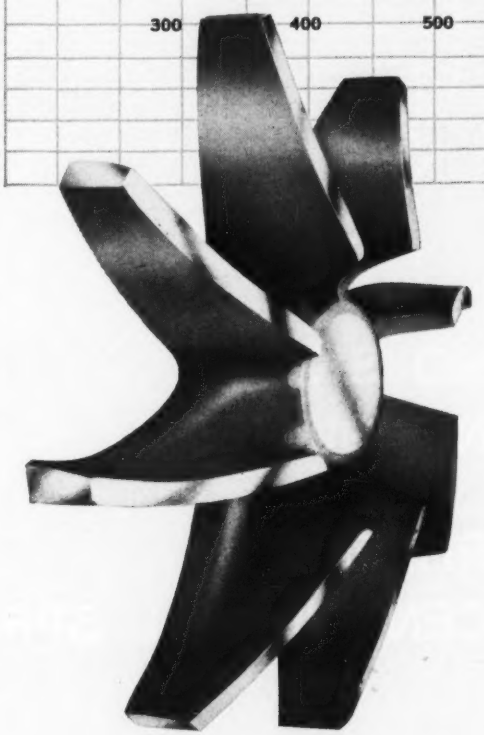
The source can be safely loaded and unloaded with remote handling equipment. However, if the line contains thick sludges or similar material, these could cause complications by obstructing the unloading. Recovery by cutting the pipe could also result in dangerous exposure.

Solution: The problem can be solved by building a lead pot into the go-devil. The radioactive source fits into the pot. A specially-designed pressure-sensitive device attached to the pot insures that the source remains inside the container under normal atmospheric pressure. The source is forced out only when the container is subjected to the normal line pressure.

Results: In case of jamming, it is only necessary to lower the line pressure. Reducing the pressure permits the radioactive source to automatically retract into the container, placing it into a safe position. The go-devil can then be recovered by the most practical method.

(Further information about the safety device may be obtained from Patents Exploitation Officer, U. K. Atomic Energy Authority, 11, Charles II Street, London, S.W. 1, England.)





The Impeller that *KEEPS ITS YOUTH*

Your concern for the efficiency of a centrifugal pump shouldn't cease just because you've seen it operating acceptably upon installation. As time goes by and internal clearances are increased by wear and corrosion, will you continue to get the performance you expect?

If you've specified a LaBour Type Q or Type SQ, the answer is, "Yes." That's because these pumps use no sealing rings or other critical close-running parts on which efficiency depends.

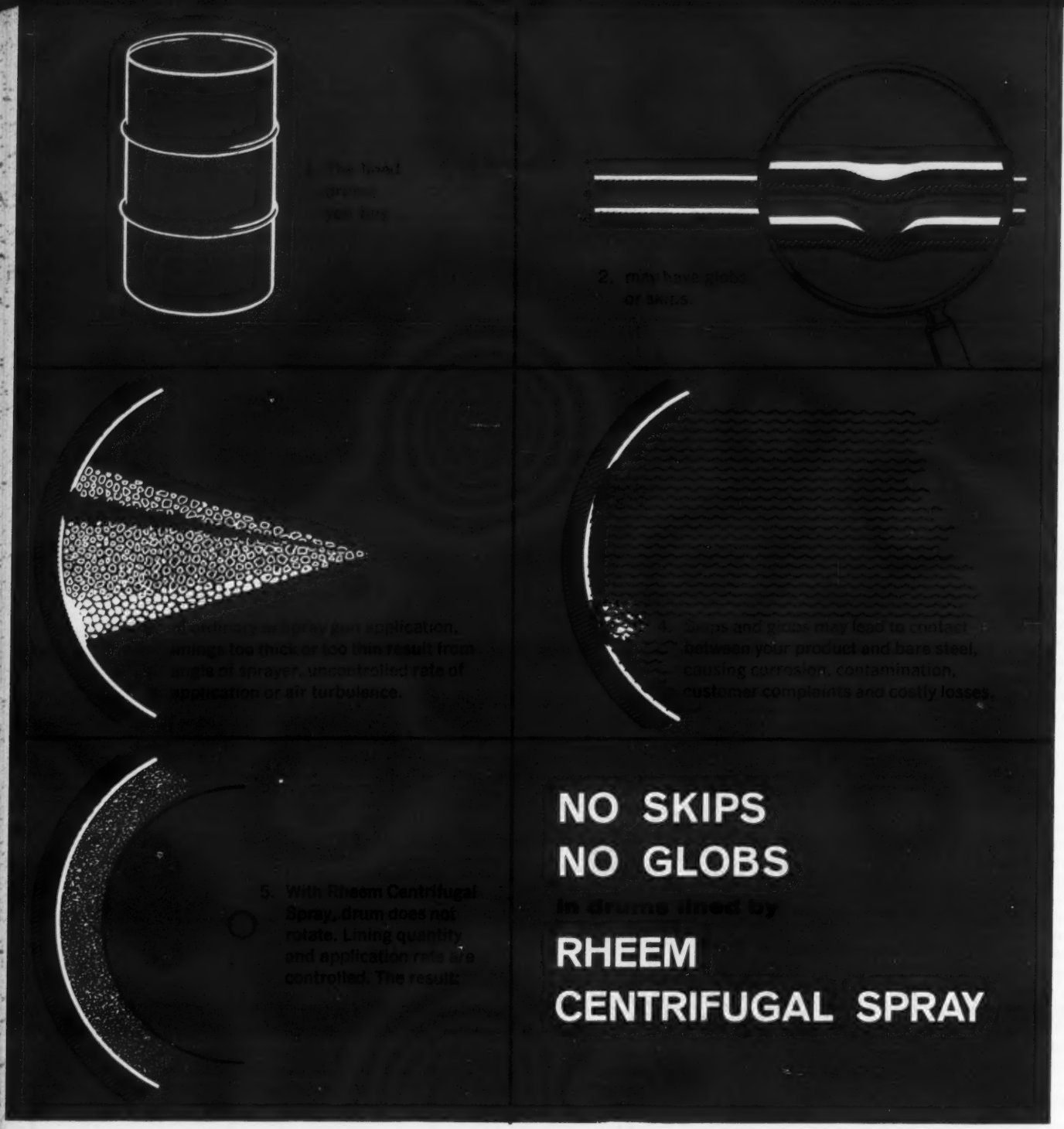
Compare the two performance curves of a typical LaBour pump with standard initial clearances and the same pump after clearances had been deliberately made four times as great. This is real preservation of youthful vigor—and it's done with an open impeller.

ORIGINAL MANUFACTURERS OF THE SELF PRIMING CENTRIFUGAL PUMP

LABOUR

THE LaBOUR COMPANY, INC. • ELKHART, INDIANA, U. S. A.

Check 3049 opposite last page.



And that's not all. For more than three years Rheem Centrifugal Spray has been delivering lined drums free of pinholes, blisters and thin spots. Air turbulence is eliminated. Human error is eliminated. Lining thickness is controlled to within 1/10 of a mil. Linings are cured by unique Rheem Vertical Curing in three stage, high temperature ovens. For more information, or help in developing a lining for a problem product, write the world's largest manufacturer of steel shipping containers at 1701 West Edgar Road, Linden, New Jersey. Plants across the country . . . Chicago, Houston, Linden, New Orleans, Richmond, Calif.; South Gate, Calif.; Tacoma. For other sales offices see the Yellow Pages.

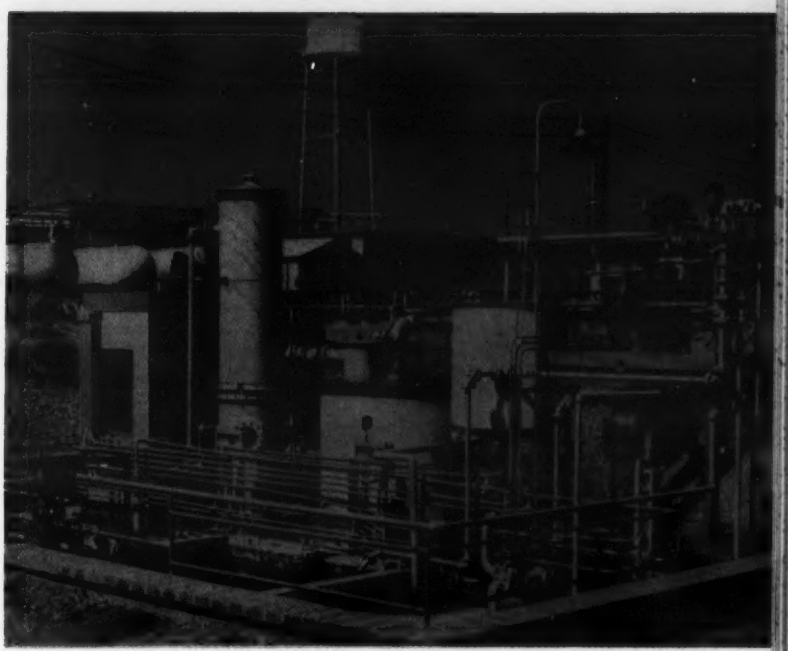
Check 3050 opposite last page.

Rheem

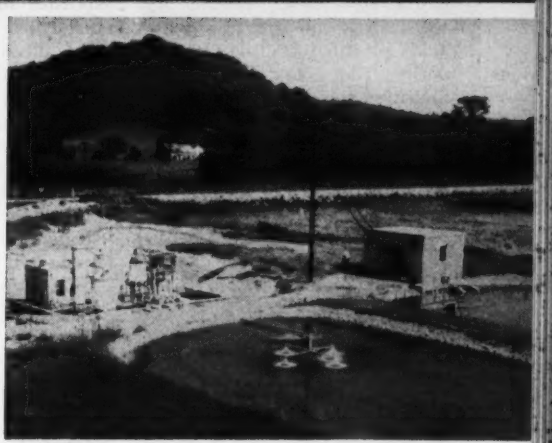
Organometallic plant waste purer than river water

Metal & Thermit uses submerged combustion to free effluent of toxic organics

TED F. MEINHOLD, Associate Editor
with **ARTHUR A. MANDELL,** Plant Manager
Metal & Thermit Corporation
Carrollton, Kentucky



Compact waste-treatment apparatus processes about 14,000 gal aqueous plant waste per day. Submerged combustion occurs in center unit. Packed tower to left preheats feed and also separates some of lower boiling products



Overall view of waste-treatment area. Treated water is aerated and diluted in reservoirs before being discharged into Ohio River

CP Staff Photo

Problem: In the manufacture of organometallics at its Carrollton, Kentucky, plant, Metal & Thermit Corporation also produces large volumes of aqueous waste by-products that it must dispose of. Most of this waste consists of magnesium chloride and small amounts of cyclohexane, toluene, and other solvents.

Using simple, inexpensive waste-treatment procedures, the material could probably be dumped without danger of pollution directly into the nearby Ohio River. However, if by accident some of the organometallics found their way into the effluent, the picture would change. Even trace quantities could have a toxic effect on the aquatic life.

Solution: Company installed a waste-treatment system that uses submerged combustion to remove harmful volatile materials. Key unit is a compact, high-velocity, five-million-Btu/hr gas-fired burner which fires down a vertical tube extending below the liquid surface of the treatment chamber. The resulting heat converts all toxic organics into carbon dioxide.

Hot gases break up into small bubbles and pass up to the surface and out through exhaust stack. Heat transfer is close to 100%. Gases leave surface at nearly the same temperature as the liquid (about 210°F). To further improve efficiency, a packed tower section is located in the gas exhaust line. Feed to heating tank enters top of tower at rate of 50 gpm, flowing countercurrent to gas flow. This preheats the feed and also separates some of the lower-boiling materials.

Waste Must First Be Neutralized

Prior to being exposed to the oxidation process, the waste is neutralized with either sulfuric acid or sodium hydroxide. Concentrated material from the heating tank is filtered through a 100-sq-ft pressure-leaf filter which removes any remaining solids. These are later hauled away to disposal area. Filtrate is sent to large reservoir for extensive aeration. Plant cooling water is used to dilute the filtered water by factor of 900.

Results: Water discharged into the Ohio River is purer than the river water itself. Analyses show that it contains only about 50 to 90 ppm of harmless magnesium chloride. The plant processes about 14,000 gal of aqueous waste per day. Approximately three million gpd of treated water are dumped into the river.

Because of the efficiency of the waste treatment system, the entire operation is carried out without objectionable odor or waste disposal. The Ohio River Valley Water Pollution Control Board, which maintains strict surveillance and control of all industries emptying water and other material into the river, has approved the operation.

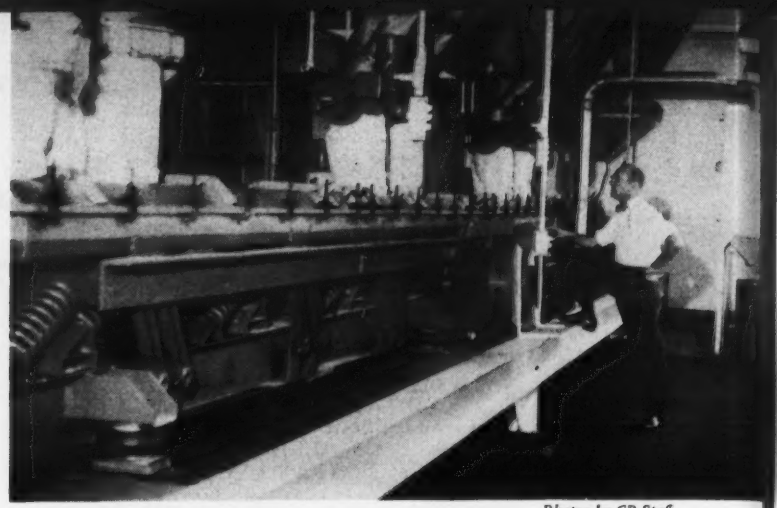
(Further information about Sub-X waste combustion system may be obtained from Thermal Research & Engineering Corp., Conshohocken, Pennsylvania.)

Check 3051 opposite last page.

Limited floor space handicaps many production expansion programs. Faced with this problem, Chas. Pfizer & Co. switched to compact vibrating material handling units. Expected to pay out in three years, system . . .

Conveys and classifies more organic acid in less space

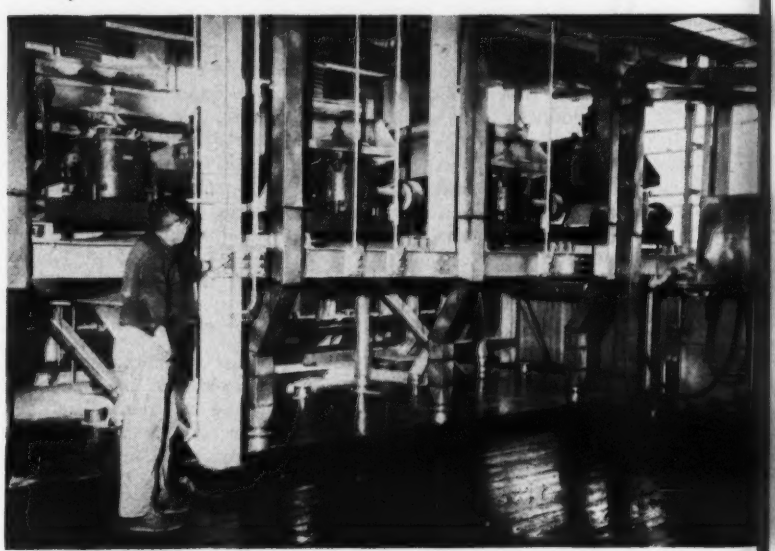
TED F. MEINHOLD, Associate Editor
with **H. G. FLIEGEL,** Department Head,
Chas. Pfizer & Co., Inc., Groton, Connecticut



Photos by CP Staff

▲ Vibrating conveyor simultaneously moves four different particle size classifications of an organic acid from bins to packaging area

Gyratory screeners operate continuously, accurately separate the organic acid into four classifications. Each machine has four 20-sq-ft screen surfaces ▼



Problem: Expanding floor space in an operating shop without losing production can be expensive. One of the biggest problems at Chas. Pfizer's Groton plant existed towards the end of an organic acid production line, where sifting, conveying and storage facilities were located.

Existing equipment in this spot was bulky and sorely overtaxed. Complexity of gravity-flow, multi-floor ductwork serving the various units was such that duplication of the equipment in the allotted amount of floor space was impossible.

Final drying is performed by rotary drum dryers. Dried product is separated into several classifications. After classifying, individual fractions are stored in big stainless steel bins ready for packaging.

Solution: Space-hogging ductwork and conventional sifters were replaced by two four-channel-design, vibrating conveyors and four high-capacity, gyratory-motion screeners. All of the units feature dust-tight construction and require only minimum head room. Conditioned air is used as protective gas blanket inside the equipment. The moving air layer guards the sifted product against moisture pickup and prevents caking.

As it comes from the dryers, product is sent to a stream splitter. Machine divides material into four equal loadings and passes it onto the first vibrating conveyor. Conveyor's trough is divided into four parallel channels, each separated from one another by a permanent horizontal divider.

Channels are 4" wide by 34' long. Each picks up one of the streams from the splitter and feeds it to a gyratory screener.

The vibrating conveyor is fabricated entirely of stainless steel. Trough has no sharp corners in which product can collect. In order to clean channels between batches, it is only necessary to remove covers which are fastened to trough by quick-disconnect clamps. Channels can be washed, steamed or wiped clean in a matter of minutes. Discharge gates are provided in base of each channel.

Conveyor's springs, drive shaft and eccentric are designed for long life and minimum maintenance. There are few moving parts.

Vibrating motion is gentle. All stresses are uniformly distributed. Unit's efficient balancing system essentially stops harmful building vibrations.

The gyratory screeners are located on floor below. Dry product from the conveyor is fed into the units by gravity. Inlets are fitted with flexible, corrugated rubber sleeves which assure dust-free product flow in and out of machine.

Screeners are 47" wide, 116" long and about 51" high. Each has four 20-sq-ft screen surfaces, permitting fast separation of dry product into the four desired particle size classifications. All parts coming into contact with material being processed are made of 316 stainless steel. Each machine is driven by 2-hp motor. Screeners are completely enclosed and dust-tight.

In operation, screen surfaces are nearly level and move with a horizontal gyratory motion. Actually, there are two screening actions that take place. The first consists of a large circular motion (in horizontal plane) at feed end of machine. This gradually diminishes through length of unit to an approximate straight-line mo-

tion at discharge end. Circular motion has 2½" amplitude and speed of 263 rpm.

Second action is performed by solid, resilient rubber balls confined in pockets beneath each screen surface. Motion of machine bounces balls against underside of screen mesh, constantly cleaning the meshes and preventing blinding.

The screener's circular motion quickly spreads incoming product across full width of screen surface. The horizontal circular motion immediately stratifies the material, causing coarse particles to float to top of bed while fines sink down against screen mesh and pass through. Conveying action moves product toward discharge end of screen where graded material (from each screen surface) is discharged. Screeners are counter-balanced for smooth, quiet operation.

Classified material drops onto 34'-long vibrating conveyor similar to the one feeding screeners. Each of the conveyor's four channels carries its specific grade of product to proper storage bin.

Stainless steel bins are used to store the various cuts. Sufficient storage capacity is available to provide for most economical operation of the packaging equipment.

Results: In operation since October 1959, the new conveying and screening system is handling the plant's increased organic acid production efficiently and economically. Occupying less space than the previous equipment, the system also requires less maintenance and operator attention.

Normal operation is continuous . . . 24 hours per day,

Next Month

What happens to this product after it reaches the storage bins will be described in our next issue. Efficient operations used by Pfizer to package, pallet and ship the finished material will be discussed in detail.

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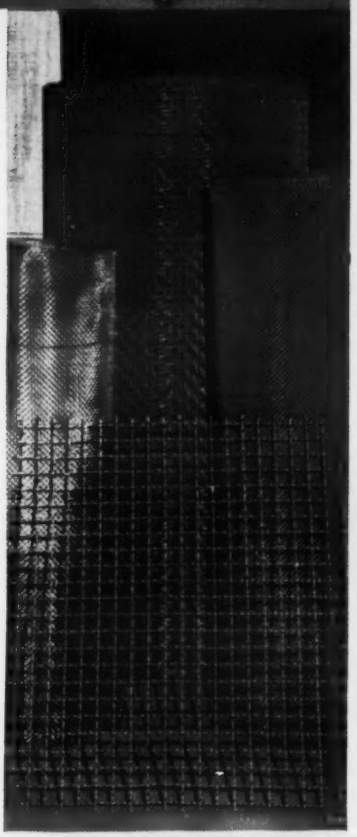
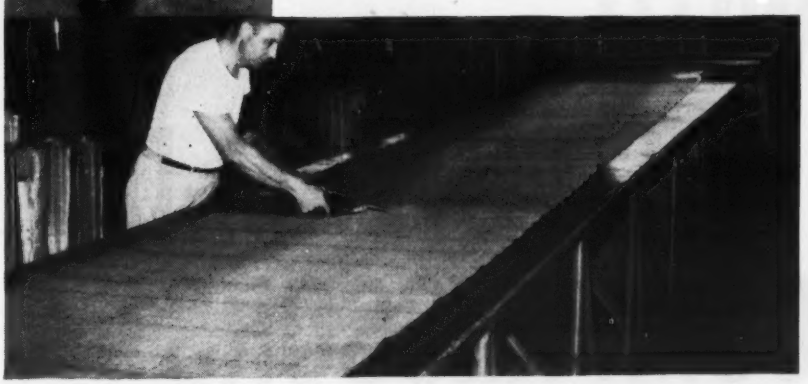
Manufacturers of Wire Cloth, Metal-Mesh Conveyor Belts, Wire Cloth Fabrications





Check 3052 opposite last page.

seven days a week. Improved accuracy of particle size separation, greater capacity, and minimum maintenance and power consumption are factors that have all contributed to lower processing costs. Estimates are that the system will pay for itself within three years.

Because of the equipment's dust-free operation, plant housekeeping has been simplified. System's capacity is such that production boosts in output can also handled.

(Natural Frequency vibrating conveyors were manufactured by Carrier Conveyor Division, Chain Belt Co., 211 North Jackson St., Louisville 2, Kentucky.)

Check 3053 opposite last page.

(Model-44 Rotex screeners are product of The Orville Simpson Company, 1230 Knowlton St., Cincinnati 23, Ohio.)

Check 3054 opposite last page.

Tough seals produced with epoxy cement in refinery lab

Bonds metal to glass, resists hot waxes, solvents

Problem: Glass graduated tubes had to be sealed into metal fittings so that the joint would be impervious to attack by hot petroleum waxes and solvents in the laboratory of a West Coast refinery. Temperatures would range anywhere from 128 to 250°F. Numerous sealants were tried, including litharge and glycerine mix, but none could satisfactorily resist the chemical and temperature attack.

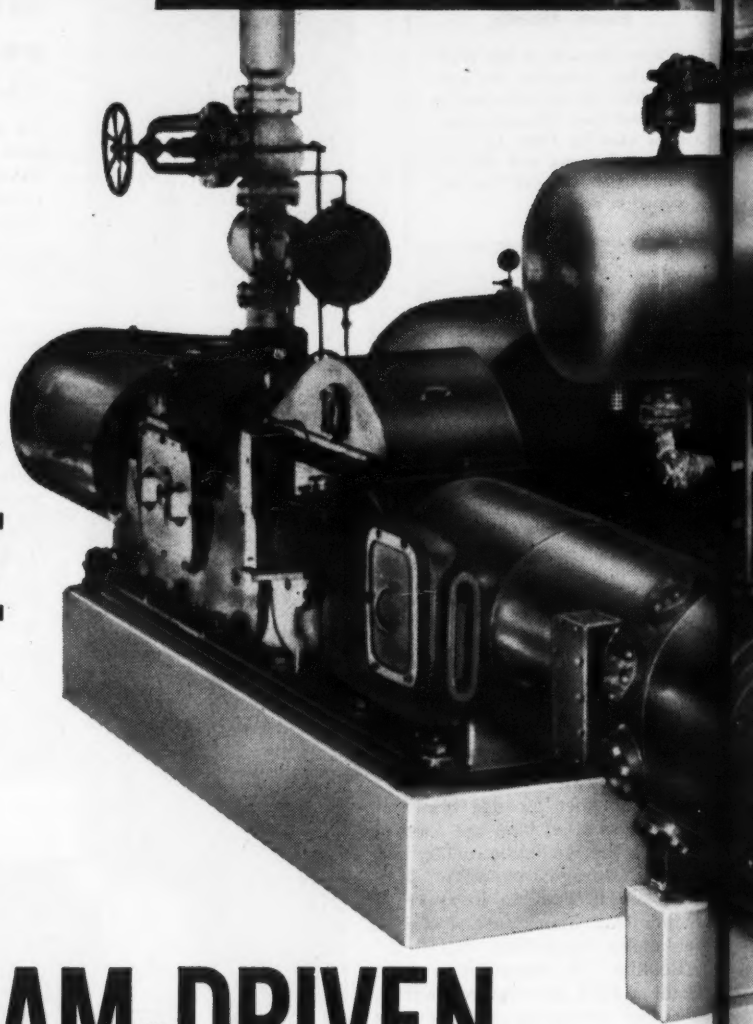
Solution: An epoxy cement, known as Metalset A-4, was tried. Requiring only a simple one-for-one mixing step, material is easy to prepare. The only pre-application step required is to clean the surface of the areas involved.

Results: The epoxy cement produces a joint impervious to attack by the hot petroleum waxes and solvents. A strong, leak-resistant bond is created. Big advantage of the material is that it is easy to

Steam-driven compressors are still preferred where there is a need for exhaust steam for heating or process work, and where it is important to protect against shut-down in the event of electric power failure.

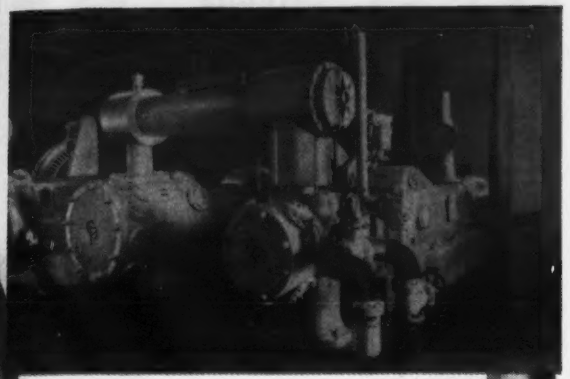
Chicago Pneumatic offers a complete line of steam-driven compressors from 20 to 1250 h.p., and for discharge pressures varying from vacuum to 15,000 p.s.i.g.

A battery of three Class H steam-driven compressors and two electrically-driven compressors installed in a prominent automobile manufacturing plant.

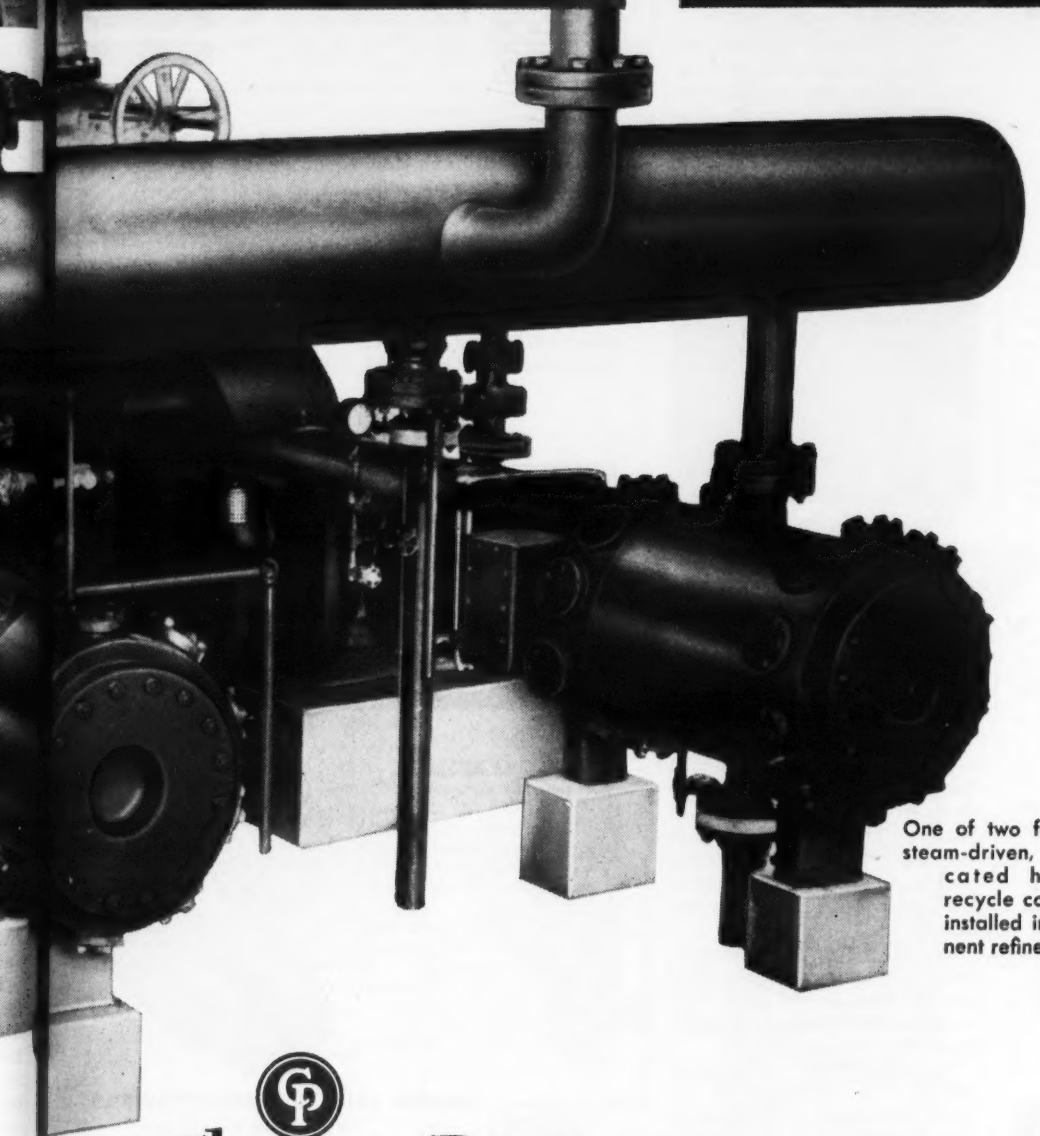


GET FULL VALUE FROM AVAILABLE STEAM... WITH CP STEAM-DRIVEN COMPRESSORS

Class H steam-driven compressor with simple steam end furnishing general refinery air.



Class H four-corner, steam-driven, single-stage booster compressor handling hydrocarbon gas.



One of two four-corner, steam-driven, non-lubricated hydrogen recycle compressors installed in a prominent refinery.

Chicago Pneumatic 8 East 44th Street, New York 17, N. Y.

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

Check 3055 opposite last page.

apply with no mess involved.

The refinery has also used the cement for other bonding applications where resistance to gasoline vapors and liquid is imperative.

(Further information about Metalset A-4 epoxy cement may be obtained from Smooth-On Manufacturing Co., Jersey City, New Jersey.)

Check 3056 opposite last page.

Titanium tube tames sodium hypochlorite at Kuehne

Titanium tube has been satisfactorily handling corrosive sodium hypochlorite for the past three years at Kuehne Chemical Company, Elizabeth, New Jersey. Used as a heat exchanger, the tube is installed in a water jacket of

Disconnected coupling shows ⅝" OD titanium tube within jacket of galvanized steel pipe

a larger diameter galvanized steel pipe. Sodium hypochlorite solution enters tube at about 97°F. It is cooled to the temperature of the cold water running through the jacket.

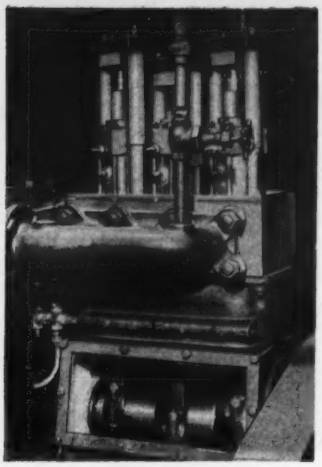
Feed rate is about six gpm. The titanium tube has ⅝" OD with 0.028" wall thickness. Similar tube is used to convey the sodium hypochlorite solution from the reaction area to the heat exchanger and from the heat exchanger to storage.

The grade of metal used is noted for its resistance to chloride salt solutions, wet chlorine gas and concentrations of up to 5% hydrochloric acid.

(RS-55 titanium tube is product of Republic Steel Corporation, 224 E. 131st St., Cleveland 8, Ohio.)

Check 3057 opposite last page.

Colmonoy Protected Plunger Outlasts Other Two in Triplex Pump Test

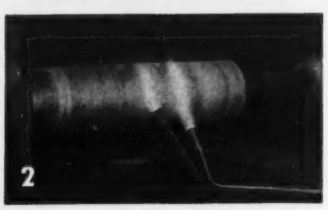


A Colmonoy hard-surfaced pump plunger was operated along with two other standard plungers in a four-month test by Cardinal Chemical Co. After pumping 748,524 gallons of acid, oil, and various sand-laden fluids, the Colmonoy surfaced plunger showed no signs of wear whatsoever. The two unprotected plungers suffered severe wear, having almost reached the limit of their usefulness. Discover for yourself how Colmonoy hard-surfacing extends equipment life, reduces down-time and maintenance costs.

Applying Colmonoy Sprayweld Hard-Surfacing:*

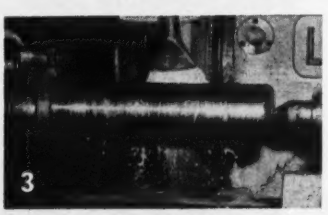
1

Plunger is prepared for spraying by undercutting and grit blasting. The Colmonoy Spraywelder sprays powdered Colmonoy alloy on the turning part.



2

The Colmonoy surface is then heated to about 1900° F. to create a welded bond between overlay and base metal.



3

Sprayweld overlays are smooth and evenly applied, require little finish grinding.

Ask for the Spraywelder Catalog and Colmonoy Hard-Surfacing Manual No. 79.

*Registered trade-mark

HARD-SURFACING AND BRAZING ALLOYS

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Check 3058 opposite last page.

NEW SOLUTIONS

Hot hydrazine handled by high-nickel alloy heat exchanger tubes

Last six times longer than former tubes

Problem: Heat exchanger tubes made of steel alloy were lasting only six months at Fairmount Chemical Company, Newark, N. J. Used in a hydrazine separation process, units had to withstand severe corrosive attack and thermal shock.

The company manufactures hydrazine and various derivatives from a basic reaction of urea and sodium hydrochlorite. After reaction, the solution is passed through the separation process in which the liquid-solid solution flows through the heat exchanger at high velocity. Vapors are flashed off in an evaporator and condensed. Fractionating column then separates the solids.

Heat exchangers equipped with high-nickel alloy tubes have withstood corrosive action and thermal shock encountered in hydrazine separation process for over three years

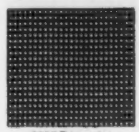
A number of these separation processes are operated series. Each is equipped with a vertically mounted, straight-tube heat exchanger.

Solution: High-nickel alloy tubes were installed in the heat exchangers. A specially designed baffle system was also installed which provides even distribution of heat to prevent solids from caking and plugging the tubes.

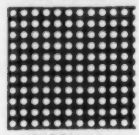
Results: The nickel alloy

H&K Perforated Screens

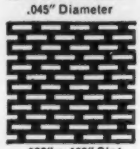
for Grading Sieving Dewatering Filtering Straining • Sterilizing and Tote Baskets



.020" Diameter



.045" Diameter



.028" x .125" Slot

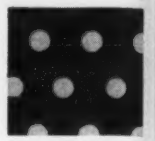
FIND NEAREST H&K AGENT in the 'Yellow Pages'

Listed Under "Perforated Metals"

H&K perforated screens are furnished, to customer order, with holes accurate and uniform in size, shape and spacing. The screen resists blinding as burr-free holes are slightly larger at the bottom. H&K perforated screens can be furnished with margins or unperforated areas in practically any material desired.

H&K specializes in the perforating of stainless steel, monel and other corrosion-resistant alloys.

Contact either H&K office or an H&K agent. Let us work with you on your perforated screen requirements.



Tapered Round Holes in Steel

No. 3 Diagonal Slot

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Check 3059 opposite last page.

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DARCOVA PUMCUPS—long noted for unequalled efficiency and life in all kinds of cylinders—are now greatly exceeding their own performance records! The new 100% Nylon Composition, available *only* in Darcova Pumcups, does it!

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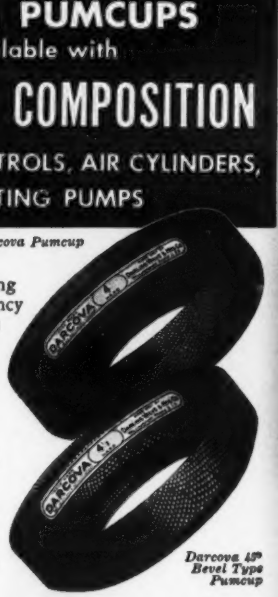


Darcova 45° Bevel Type Pumcup

DARLING VALVE & MANUFACTURING CO.
Williamsport 4, Pa.

TRADE MARK PUMCUPS

Check 3060 opposite last page.

tubes have eliminated the costly and troublesome problem of pulling and replacing tube bundles. Tubes have already seen three years of service and are still going strong — a big improvement over the six month limit formerly experienced.

(High-nickel alloy tube heat exchangers are product of Patterson-Kelley Co., Inc., Warren St., East Stroudsburg, Pennsylvania.)

Check 3061 opposite last page.

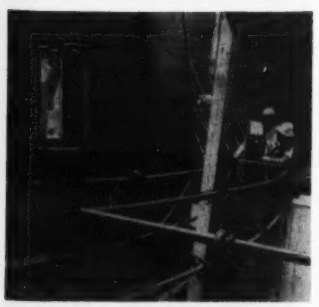
NEXT MONTH

Can one filter do a better job than three? Diamond Alkali tried it on a brine filtration application — and saves over $2000 a year! Look for the story in August CP.

A-plant construction speeded by portable x-ray machines

Provide quick, accurate check of critical welds

Portable x-ray units are playing an important part in the constructing of nuclear power plants. Case in point is the 134,000 kw Yankee Atom-



Mounted on wheels for easy mobility, portable x-ray machine simplifies testing of 125-ft diam steel sphere that houses nuclear reactor

ic Electric Company installation at Rowe, Massachusetts.

X-ray inspections were made on all critical welds of the 125-ft diam steel shell that houses the reactor, heat exchangers and auxiliary

There's an old song that goes something like this: "It Ain't What You Do; It's The Way That You Do It." This holds true for wet dust collection and one of the most effective ways of **doing** it is dynamically with a Ducon UW-4 Scrubber.

The centrifugal forces and water action inside this scrubber, combining with the unique and effective dynamic action of the high velocity fan in the second stage of operation, literally swirl, swat and scrub all the dust particles from the gas stream.

The UW-4 Scrubber is a most effective unit for separation of extremely fine dusts and abrasive materials and is ideally suited for heavy dust loads and high temperature applications.

Send for Bulletin 7460.

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Check 3062 opposite last page.

Easy maintenance is designed into every American-Standard exchanger

Convenient inspection and service through simplicity of design mark every heat exchanger from American-Standard* Industrial Division. All permit quick access to the inside of the tubes. And the tube bundle is removable on almost all models. So wherever you want to cool lube oil, jacket water, hydraulic fluid, air or gas, or heat various fluids, look to American-Standard Industrial Division. We make standard and specially engineered exchangers for virtually all conditions and applications. Simply call our nearest office. There's one in every principal city. American-Standard Industrial Division, Detroit 32, Michigan. In Canada: American-Standard Products (Canada) Limited, Toronto, Ontario.

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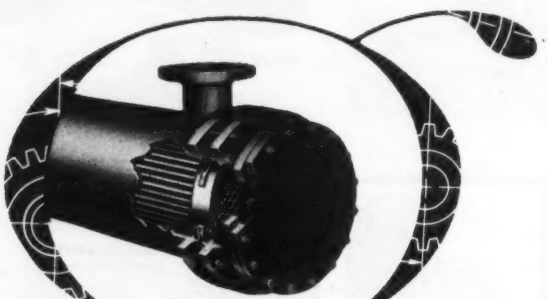

anger

Check 3063 opposite last page.

equipment. Because of their reliability, compactness, ease of handling and ruggedness, the x-ray machines proved to be adaptable to a wide range of applications.

Larger machines (200 and 260 kv) were used where 100% inspections were required. A 140 kv unit was utilized when sample checks were only needed. The machines are mounted on a wheeled carriage and used with lightweight block and tackle hoist for quick positioning. A 200 kv machine weighs about 85 lb and can x-ray steel up to 3″ thick.

The $50 million atomic installation is scheduled for completion by late 1960. The reactor core is about 6 ft in diam and 8 ft tall. Water pressure inside the core will be 2000 psi.

(Further information about Baltospot and Baltograph portable x-ray machines is available from Balteau Electric Corporation, Stamford, Conn.)

Check 3064 opposite last page.

Role of X-rays at Ford laboratory is told in reprint of technical article. Details are revealed about work with boron oxide glasses. Sample preparation, X-ray instrumentation set-up and test procedures are discussed. Reprint, "X-Rays at Ford" — Philips Electronics Instruments.

Check 3065 opposite last page.

"You'll also like the way we've extended quality control to include our cafeteria kitchen."

Corrosion Management *From page 27*

ever, considerable room for improvement in our understanding of how to go about controlling it and what we may logically expect to be the results of a successful effort.

When you consider that construction of chemical production and research facilities alone in 1960-61 has been forecast at $1.6 billions, you can readily see how close attention to corrosion problems in the design stage could bring marked benefits in longer-lived equipment and facilities and, logically, more profits. The Manufacturing Chemists' Association survey shows that over a billion dollars in chemical production and research facilities was completed in 1959.

Likewise, close attention to corrosion problems and a sound understanding of the reasons corrosion needs specialized attention is necessary in plant operations. This is true because of the vast investment in facilities now in operation and because, as many plant officials have learned to their sorrow, small changes in the content of process streams, velocities or temperatures may have disastrous effects.

Shutdowns Cost $$

Today's industries, with their emphasis on liquid-phase, continuous operation; the universal trend toward electronic controls, centralized dispatching and long-distance operation; and the need to reduce and better utilize manpower through mechanical aids are increasing capital investment per employee and often per unit of product. This means that interruptions of production cannot be tolerated because the losses in product, interest on investment and in equipment are too great to absorb.

This places a high premium on component reliability. Some authorities estimate that many plants must have component reliability on the order of 95% in order to make a profit. Few companies can afford to duplicate plant elements to the extent that alternate process lines are always available in the event there is a failure.

While failures caused by corrosion are by no means the only ones that must be considered, it is true that the trend toward more corrosive streams, moving at greater velocities and at higher pressures and temperatures, makes this factor at least as important as others. In some industries corrosion problems must be solved or plants cannot operate at all.

Another facet of the corrosion problem which is not always recognized is that of the safety factor. Management people probably have given more thought to this aspect of the corrosion control problem than others.

It is a function of the National Association of Corrosion Engineers to collect from its scattered sources throughout the world useful information corrosion engineers need to do their work well. This is accomplished through meetings, publications and by cooperation with other organizations doing corrosion work in this country and abroad.

Improving Communications

A most important cog in NACE's many-spoken wheel of communications is Corrosion magazine. The organization is also improving communications through several other kinds of activities. Meetings are held on national and regional levels throughout the year. In the recent national conference in Dallas, attended by some 1800 men working in corrosion control, specialists in many fields were represented, from atomic energy to marine biology.

Because there are few opportunities for engineers to get formal instruction on corrosion control matters in regular college curricula, NACE has been active for years in holding short courses for its members, and for that matter, for all who are concerned with corrosion.

So, Mr. Executive, again I ask: "Who's your corrosion engineer and how is he doing?" You're paying a much greater share of the annual $6 billion corrosion bill than is necessary. Why don't you do something about it? ■

CHEMICAL PROCESSING — CORROSION CONTROL . . . 7th Annual Feature

Starting on the next page is a 38-page section containing timely technical information to help you combat corrosion. Here's a quick look at some of the highlights:

Corrosion management — Lack of it costly luxury for today's plants, says NACE head 27

Coping with Zr-plant corrosives — 40 nickel-alloy pumps perform virtually trouble-free 50

Lining pipe with PVC — Economical method designed for protecting pipe 3 to 36" diam. 51

Reinforced epoxy tanks — Sizes up to 12' diam for storage of corrosive materials 52

Conquering chloride corrosion — With high-alloy trays in still, turnaround is bypassed 53

Double service life — Urethane coatings on recovery plant unperturbed by vapors, salt 56

High-temp corrosive nemesis — Porcelain-enameled steel scores wins 58

Current Literature — Brief reviews screened for corrosion-control engineers 60

Abrasives, acids rebuffed — Impervious graphite pump in excellent condition after 2½ yr 66

Tube has Ti, Ta or Zr liner — Thin layer bonded to low-cost base 69

Technical papers — Protecting cooling towers; epoxy/pitch coats; bisphenol polyesters 72

Epoxy-phenolic-coated barge tow — Cargo bins protected for transportation of corrosives 78

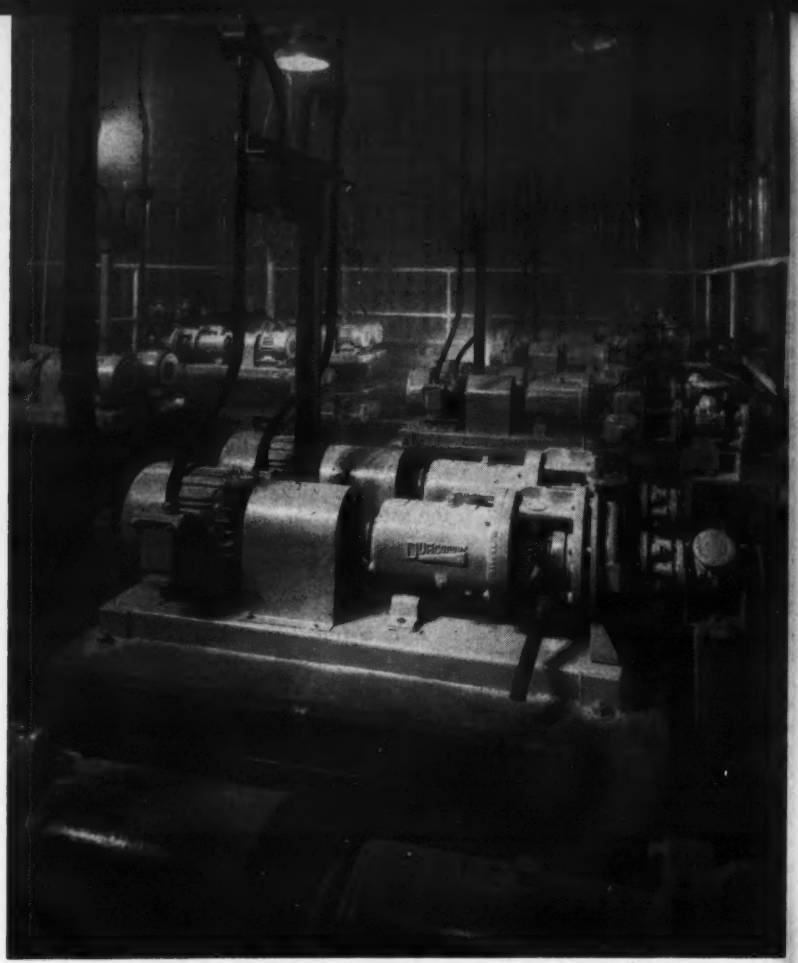
Corrosion Keys — Quick-check charts size up polyethylene performance in corrosives 79

Flip page to begin Feature →

Virtually trouble-free record posted by nickel-alloy pumps for Zr-plant corrosives

Design of shafts and bearings, nickel alloy construction and water-lubrication of seals allow pumps to provide top performance

GORDON WEYERMULLER, Associate Editor
with **JAMES R. GILLIGAN,** General Foreman
Carborundum Metals Company
Div. of The Carborundum Company
Parkersburg, West Virginia



Corrosive vapors cast an eerie effect over these nickel-alloy pumps used for handling highly acid zirconyl chloride solution at Carborundum Metals Company

Four different types of corrosive solutions used in the manufacture of zirconium are being successfully handled by 40 centrifugal pumps designed specifically to meet tough chemical processing applications such as this. Pumps have operated virtually trouble-free for up to three years in following services.

Service Conditions Are Tough

Seventeen of the Series QHB2R Durcopumps handle a 2.5-4.0 normal solution of thiocyanic acid in an organic solvent at ambient temperatures. Flow rate varies between 350 and 425 gpm and discharge head from 45 to 50′. Pump speed is 1750 rpm.

Nineteen similar pumps handle an aqueous solution of zirconyl chloride having a pH of about 1.0 at ambient temperatures. Flow rate varies between 150 and 200 gpm and discharge head from 40 to 50′. Speed of these pumps is also 1750 rpm.

Three additional pumps of same type handle a hafnium sulfate solution with a pH of less than 1.0 at ambient temperatures. Flow rate is about 60 gpm and discharge head about 40′. Pump speed is 1750 rpm.

One High-Speed Pump Handles 1200 gpm

One similar pump handles ammonium chloride solution with a pH of less than 2.0 at 160° F. Solution is pumped through a clarification filter at a rate of 1200 gpm against a head of 70′. This pump operates at the higher speed of 3500 revolutions per minute.

Heavy-duty pump is designed specifically for corrosive service with regard to such things as shaft sizing and bearing loading. Shaft is of large diameter for minimum deflection and long bearing life.

Casing has heavy wall section and is constructed so pump can be quickly and easily disassembled. Impeller is of semiclaw design. It is designed so as to have low NPSH requirements. All of the pumps were modified to provide water-lubrication of sealing surfaces since that method of sealing was found to be the most satisfactory for this service.

All of the pumps are constructed of Chlorimet 3, a high-nickel alloy containing 60% nickel, 18% chromium, 18% molybdenum, 3% iron, 1% silicon and 0.07% carbon.

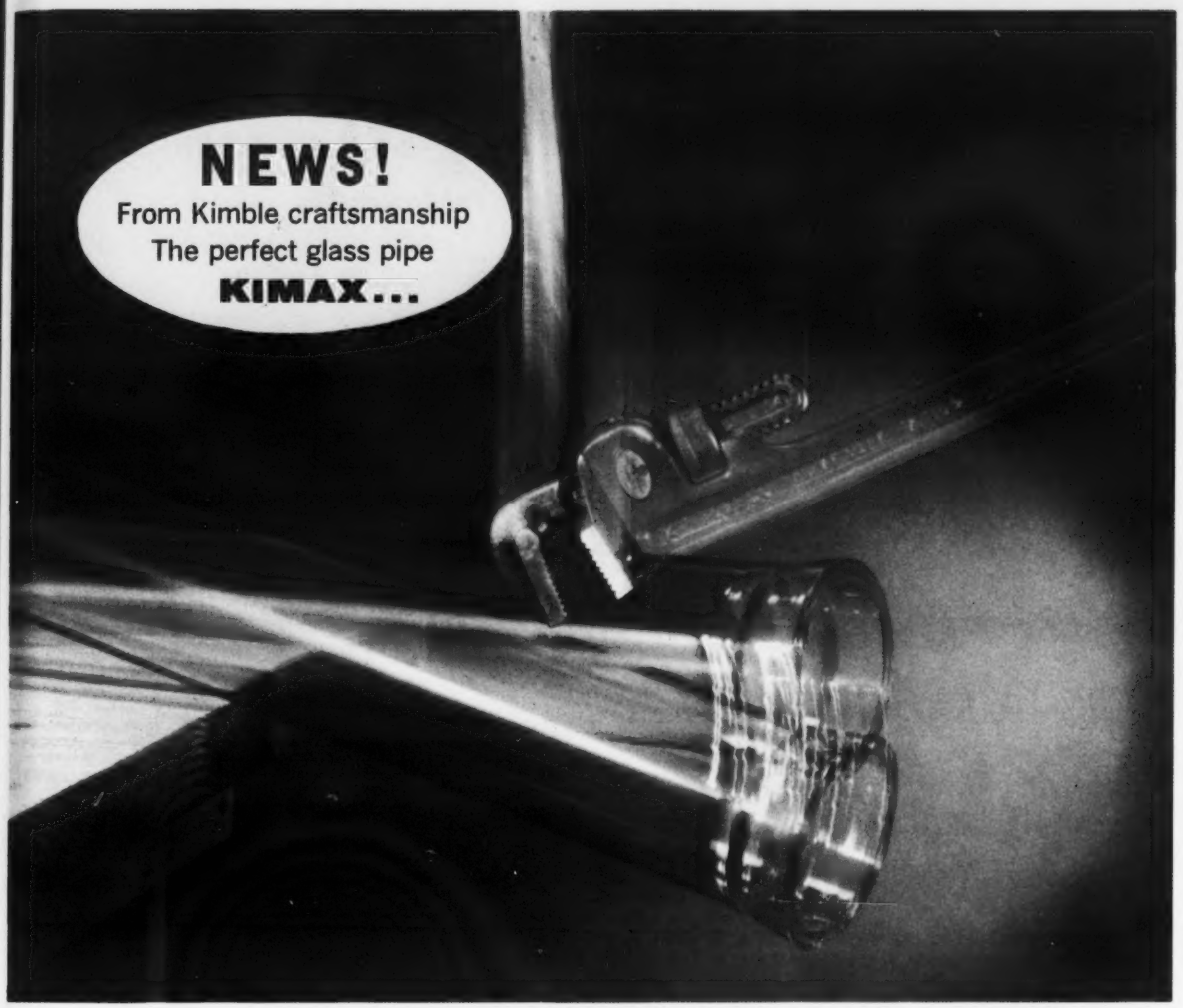
Corrosives Resisted by Pumps For Up To 33 Months

Pumps have withstood the corrosives to which they have been subjected very well, having operated virtually trouble-free for up to 33 months. On four of the pumps handling the thiocyanic solution, it was necessary to turn shafts down and install a zirconium sleeve. Original shafts are still operating satisfactorily on all of the other 13 pumps handling the same solution continuously for nearly three years.

(Series QHB2R Durcopumps are product of The Duriron Company, Inc., 450 Findlay St., Dayton 1, Ohio.)

Check 3066 opposite last page.

For more information on product at right check 3067 opposite last page



Kimax Tempered Glass Pipe never affects your product.

Made rugged for amazing resistance

One of the many benefits of Kimax Tempered Glass Pipe is its ruggedness. Selective tempering and one-piece construction give an unusual degree of mechanical strength and resistance to normal abuse.

Yet this pipe is light in weight for easy handling and installation.

It has amazing heat resistance —operating in temperatures up to 450°F. It shrugs off heat shock to permit quick transition from hot to cool flow, speeding cleaning and reducing down time.

Smooth inner walls of Kimax Tempered Glass Pipe prevent scaling and corrosion. Since glass is inert, nothing is added or taken from the products flowing through this pipe . . . total assurance of constant product purity.

Transparency permits a rapid, visual check for stoppages. When clogging occurs, cleaning is quickly and easily done since every joint is easily disassembled.

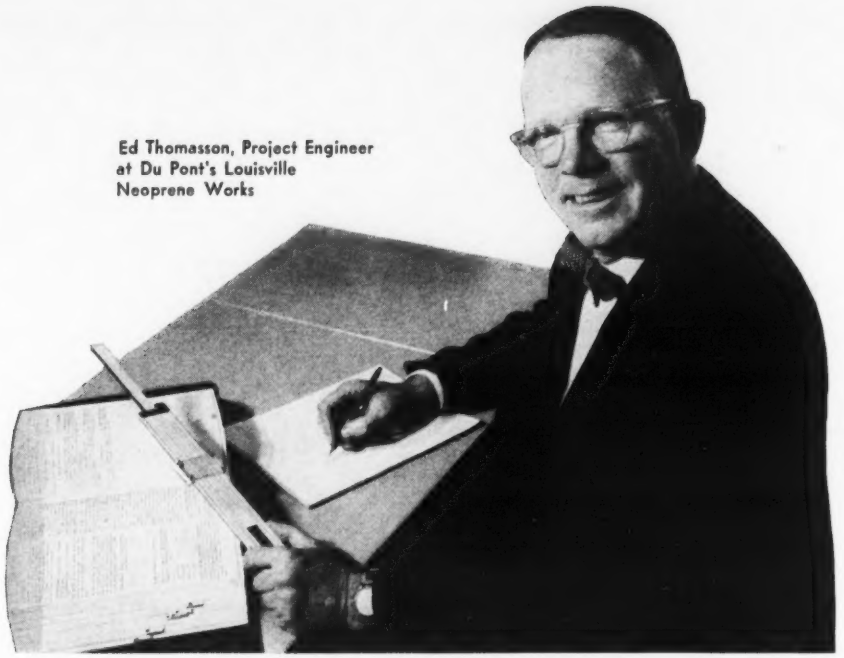
Light-weight, durable, and economical Kimax Tempered Glass Pipe is available with complete fittings and accessories for every piping requirement, and is interchangeable with other piping.

For your free copy of the current catalog, write to Kimble Glass Company, subsidiary of Owens-Illinois, Toledo 1, Ohio.

Nationally distributed by Fischer & Porter Company, Warminster, Pa.

KIMAX TEMPERED GLASS PIPE
AN (I) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES • TOLEDO 1, OHIO



Ed Thomasson, Project Engineer at Du Pont's Louisville Neoprene Works

Page-By-Page Magazine Study

Helps Project Engineer Solve Widely Varied Problems

Edward D. Thomasson is one of those rare birds who leaves no doubt in your mind, as you watch him work, that *he* runs his job instead of his job running him.

Despite the frequent jangling jingles of the phone and a steady procession of personal visitors to consult him on the forty projects (average) he keeps moving as Project Engineer in Du Pont's Neoprene Works in Louisville, Ky., Ed manages to keep a big smile and, more important, a rational calmness so important in evaluating and developing ideas for process improvement.

A Texas A&M graduate, he's a Du Pont man from way back, starting with them in explosives operations at the Chambers Works in 1940. He moved into design work in 1945 at Chambers, and came to the Louisville Works as Project Engineer in 1954.

Now he has three engineers—and the 40 (average) projects—under his wing. He's always looking for new techniques, equipment and instruments that show promise of doing the neoprene production, packaging or handling job better.

Early in his career Ed started to realize the necessity of keeping tabs on new developments in techniques and equipment which could be used to advantage in his process-improvement projects. He got the habit of going carefully through industrial magazines such as CHEMICAL PROCESSING, looking for new products as well as new applications of old products.

Ed uses the page-by-page, article-by-article, ad-by-ad approach since his responsibilities cut across so many areas: instrumentation, corrosion control, process equipment, handling and packaging and others.

When he spots something that dovetails with one of his current projects he will of course get immediately in touch with the supplier. But he also keeps an extensive file of clippings of ideas and developments to look into for the future. And he boasts to have every single nomograph ever put out by CHEMICAL PROCESSING. What's more, he makes good use of many of them in his extremely varied design work.

Ed likes the terse, practical-technology approach used by CHEMICAL PROCESSING in reporting the latest developments. "After all," he'll tell you, "My job is to make use of all the latest developments in designing the most efficient and lowest-cost production lines. . .and doing it as fast as I can. I can get my design fundamentals and specifications from textbooks and from design manuals that Du Pont distributes and keeps up to date."

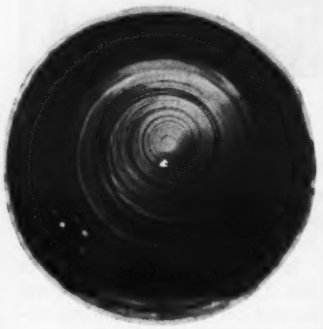
Incidentally, The Louisville Neoprene Works has just converted to a pasted-bottom open-mouth bag for more stability in palletized loads, better identification of contents, neater appearance (see page 36, this issue.) What prompted the change? A "New Solutions" article in CHEMICAL PROCESSING which gave Ed and other Du Pont engineers the "itch" to try out the bags for their neoprene.

CHEMICAL PROCESSING
PUTMAN PUBLISHING COMPANY
111 East Delaware Place
Chicago 11, Illinois
"Executive Magazines For Industry" BPA NBP

Method for lining pipe with PVC developed

Pipe is corrosion resistant low in cost

Announcement has been made of an economical way to line pipe from 3 to 36" in diameter with polyvinyl chloride. Pipe can be handled in lengths up to 60'. Spiral weld pipe can also be lined. Process for which patent application has been made, uses a special roller-coater that applies the lining on the interior of the pipe. Lining thickness runs from 1/16 to ⅛" or thicker. After lining is applied, it is heat-fused directly to steel in an oven.



Even Spiralweld pipe can be lined with a uniform thickness of PVC

Seamless lining is resistant to a large variety of chemicals, both acid and alkaline at temperatures to 180°F. Lined pipe is low in cost compared to a number of other types of corrosion-resistant piping.

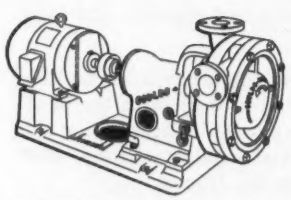
(For further information on PVC-lined pipe, contact Lithcote Corporation, Melrose Park, Ill.)

Check 3068 opposite last page.

Polypropylene stands up to acids and alkalis in plating operation

Portable plating barrels made from polypropylene have given good service for about three years in operations where they are subjected to a variety of corrosives. Units have satisfactorily withstood

IS THIS HAPPENING INSIDE YOUR PUMPS?



The Goulds-Pfaudler glassed pump is available in conventional hydraulic design, simplifying installation and maintenance. Four sizes with capacities up to 700 GPM, heads up to 140 ft.

When you pump corrosives, the inside of your pump *can* look like this. Or . . .

You can pump corrosives *without* corrosion with the Goulds-Pfaudler Fig. 3708 glassed pump. *Every surface that comes in contact with the pumpage* is protected by tough borosilicate glass fused permanently to the metal!

This glass-to-metal bond resists most acids at temperatures up to 350°F and alkalies at moderate temperatures.

You also prevent loss of product due to contamination, since glass is *inert*. Glass is *smooth*—discourages product adhesion and scale build-up.

For all the details, write for Bulletin 725.2 . . . plus a second booklet, "It's What's Inside That Counts," that gives you the inside story behind the new Goulds-Pfaudler glassed pump. Write Goulds Pumps Inc., Dept. CP-70, Seneca Falls, New York.

GOULDS GP PUMPS

Check 3069 opposite last page.

The most significant advance in gate valve design in 25 years...

CRANE FLEX GATES®

Instead of being made with a solid disc, new, patented Crane Flex Gates have separate disc faces, connected by the axle-like unit shown in the cross section. This joins the two seating faces, yet provides flexibility for the faces to seat tightly with independent action.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates seat with less torque.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates unseat with less torque . . . will not stick closed even when closed while hot and allowed to cool.

BECAUSE THEY'RE FLEXIBLE, minor deflection of seating faces due to pipe strains does not affect tightness of Crane Flex Gates.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates are tight on inlet seat and outlet seat over a wide range of pressures.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates can be used singly in some services where two conventional gate valves are frequently specified. You can save substantially on piping costs.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates can be serviced—body seat rings replaced or seating faces refinished—quickly, and without painstaking accuracy. Slightly off-taper seats do not affect tightness or operating ease.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates will easily outperform any conventional solid wedge disc valve you now use. *And there's no increase in price.*

BECAUSE THEY'RE MADE BY CRANE, these new Flex Gates are completely dependable. You can use them with complete confidence on steam, water, gas, oil or oil vapor service. Stem and disc seating faces are Crane Exelloy. Shoulder-type body seat rings are Exelloy or Crane No. 49 Nickel Alloy. Sizes: 12 inch and smaller; 150- and 300-pound pressure classes.

Ask your Crane Distributor for full information on Flex Gates—and for data whenever you work with the products Crane makes. He has the newest in information and products. Crane Co., Industrial Products Group, 4100 South Kedzie Avenue, Chicago 32, Illinois.

CRANE®

VALVES • ELECTRONIC CONTROLS • PIPING • PLUMBING • HEATING • AIR CONDITIONING

Check 3070 opposite last page.

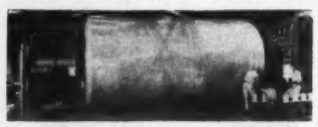
alkali cleaning, water rinsing, acid treatment and plating.

(Seilon Pro polypropylene is product of Seiberling Rubber Company, Plastics Div., Newcomerstown, Ohio.)

Check 3071 opposite last page.

Reinforced epoxy tank is corrosion-resistant and strong

Announcement is made of tanks suitable for storage of corrosive materials in sizes up to 12′ in diameter. Vessels are



Glass filaments are wound on mandrels, then bonded with epoxy plastic

constructed of glass filament rovings bonded by epoxy resins.

In manufacturing tanks of this type, glass filaments are wound on a steel mandrel under precision controlled conditions. Rovings are helically interwoven into patterns for designed strength and bonded with epoxy plastic. During the winding process, the glass filaments are coated with liquid plastic. Coated glass fibers are then wound under tension on a revolving mandrel. After desired wall thickness is reached, the vessel is heat-cured while still on the mandrel. Heat transforms the liquid epoxy into a solid bond between glass filaments and resin.

Filament winding machines are completely controlled by programmed electro-hydraulic servo system. This assures exact control of fabrication process.

(Filament-winding method is patented by Young Development Division, Hercules Powder Company, Inc.)

(Poxyglas tanks are being manufactured by Black, Sivalls & Bryson, Inc., 7500 East Twelfth Street, Kansas City 26, Mo.)

Check 3072 opposite last page.

Use of a nickel alloy top tray of a special design in this crude fractionator helped Skelly Oil to eliminate spring turnaround, saving nearly half a million barrels of production

High-alloy trays last three times longer . . .

as refinery conquers chloride corrosion in crude still . . . bypasses spring turnaround . . . saves half-million barrels production

GORDON WEYERMULLER, Petrochemical Editor
and **G. C. THRIFT,** Engineering Manager
Koch Engineering Company

Problem: At Skelly Oil's El Dorado, Kansas, refinery, sections of top tray in crude fractionator had to be replaced during each six-month turnaround period. Corrosion due to chloride buildup in the closed reflux system was taking a heavy toll. In one instance, emergency repairs had to be made when top tray corroded and fell to the tray below.

High Chlorides Caused By Side Reflux

Use of side rather than top reflux for the column was the cause of the higher than normal chloride concentration on the top tray. Side reflux is believed to be more efficient for a number of reasons. In side reflux, the hydrocarbon stream is tapped at a point below the top three fractionating trays, passed through a closed heat exchanger to heat incoming crude, and then fed back to the top tray.

This differs from top reflux where the net make is tapped at the top of the column in the vapor phase, condensed as a heat source, and returned to the top tray of the fractionating column.

Solution of this corrosion problem was important since there are a number of excellent advantages to side reflux, the most obvious being the reduction of condenser capacity requirements. Since side reflux strips heat from liquid, it is not necessary to condense vapors. Greater efficiency can be obtained since the exchange of heat from the reflux stream to the incoming crude is liquid to liquid. This also makes it possible to use steel equipment for the crude preheat.

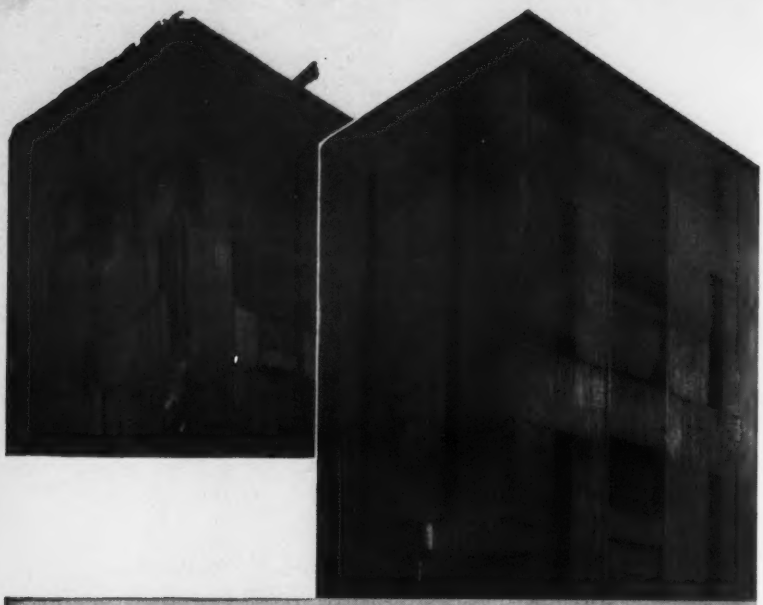
Another important advantage of side reflux is the possibility of by-passing the entire reflux system and locating the ammonia injection upstream of the final fractionating tray. This eliminates the problem of ammonium chloride precipitating and salting up of the heat exchange system.

All in all, side reflux was extremely attractive if tray corrosion could be overcome. However, the problem of chloride build-up had to be solved. The water in the closed system absorbs chlorides from the hydrocarbon stream to build up harmful concentrations. Here is a typical analysis of the water in the reflux stream:

Element	Parts per Million
Cl^-	27 to 200
Ca^+	14
SO_4^-	707
S^- (as H_2S)	370

The pH of this water is normally between 3.5 and 4.0, and reflux temperature, as it is returned to the top area where corrosion occurred, is approximately 170°F. From 18,000 to 22,000 barrels of reflux is cycled daily. Corrosion was occurring on two perpendicular diameters of the circular tray immediately below the bullhead tee where reflux is injected. Corrosion would continue until deep grooves were formed, necessitating a tray change. This condition was not noted on any of the trays beneath.

Solution: Corrosion test samples had been run since the first replacement was



Acid Processing Fertilizer Plant Gets a New Maintenance-Free Skin of RESOLITE

It's hard to believe, but this fertilizer plant had deteriorated to the condition shown in the photograph at the left in a little over four years. The deterioration was caused mainly by the corrosive conditions which exist in such operations. RESOLITE engineered and furnished over 24,000 square feet of opaque "Fire-Snuf" formulation Metal Gray Panels for walls and roof area. The material was made in the V-beam shape, and is manufactured using a special formula designed for highly corrosive acid conditions. All louver assemblies, flashing and gravity roof ventilators were fabricated by RESOLITE. All fasteners are also corrosion-resistant and supplied by RESOLITE.

Here is an example of how RESOLITE engineers can be of service to you. We are specialists in engineering the use of reinforced polyester panels, and our years of experience can be of value to you. Write today for our 8-page folder on the use of RESOLITE panels and special shapes in applications where corrosion is a problem.

Engineering Specialists in Reinforced Polyester Panels

RESOLITE CORPORATION

P. O. BOX 539, ZELIENOPLE, PA.

DISTRIBUTORS IN PRINCIPAL CITIES

Check 3073 opposite last page.

High-alloy trays last three times longer . . .

From preceding page

Typical top tray in fractionator. The 18'-diameter assembly containing more than 2000 valves is made from Hastelloy alloy B

made in the tower. Both Hastelloy alloys B and C had been included in the test and no corrosion could be detected in either. When the tray dropped, decision was made to replace it with one made of these two Hastelloy alloys. Alloy B was selected because of its generally better resistance to chlorides. Composition of alloy B follows:

Element	%
Ni	61
Co	2.5 (max)
Cr	1 (max)
Mo	28
Fe	5
C	0.05 (max)
Others	3

Use of Hastelloy alloy B was made economical by adaptation of a special, light weight, patented tray design. The 18'-diameter tray, including caps, spiders, weirs and downcomers, was made of 14-gage sheet at less than one-half the cost of a conventional bell-cap assembly. It was made in 26 sections so it could be installed through a 16" manhole. The unit weighs only 10 pounds per square foot.

The unit, called Flexitray, has a capacity equal to a well-designed sieve tray and a wider operating range than a bell-cap tray. Design is especially advantageous for high alloy construction because less metal is used and forming is held to a minimum.

Liftable caps, about two inches in diameter, operate like check valves on the tray. The caps are limited in lift and guided by four-posted, plate-stamped spiders which are clinched securely to the deck on three- to six-inch centers similar to bell-cap trays. Conventional downcomers of the chord type are employed. No gaskets are used. The tray is not sensitive to out-of-level installation, eliminating the need for adjustable weirs.

Results: Last October, after a year's service, the tray was inspected and found to be as good as new, requiring no cleaning. It was in such good condition that it contributed to a decision to leave the unit on stream instead of scheduling a regular shutdown during the spring as had been done in the past. Eliminating this shutdown saved nearly a half-million barrels of production. It is expected that the tray will last more than three years.

(Hastelloy alloy B is produced by Haynes Stellite Company, Div. of Union Carbide Corporation, Kokomo, Indiana.)

Check 3074 opposite last page.

(Flexitray distillation tray is a patented product of Koch Engineering Company, Inc., Wichita, Kansas.)

Check 3075 opposite last page.

Flexible rubber pipe used for underwater waste disposal

One of the largest installations of its kind was completed recently when 1864′ of large-diameter, flexible rubber pipe was laid from the shore to the channel of the lower Delaware River. Pipe will discharge nitric and sulfuric acid wastes from a large chemical plant in that area. In addition to withstanding these mineral acids, pipe must resist salt water.

Successive 50′ flanged lengths of the pipe were bolted together, using corrosion-resistant bolts and nuts. Flexibility of the lines simplified the bolting operation. Free end was just lifted out of the water without disturbing the sections already in place and attached to next length on dredge.

Although it is operated as an open-end 12″-diameter pump line, the rubber pipe is designed to withstand 100 psi. The strength is provided by a nylon and steel wire carcass. Neoprene cover is used for protection against external damage.

(Condor flexible pipe is product of Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N.J.)

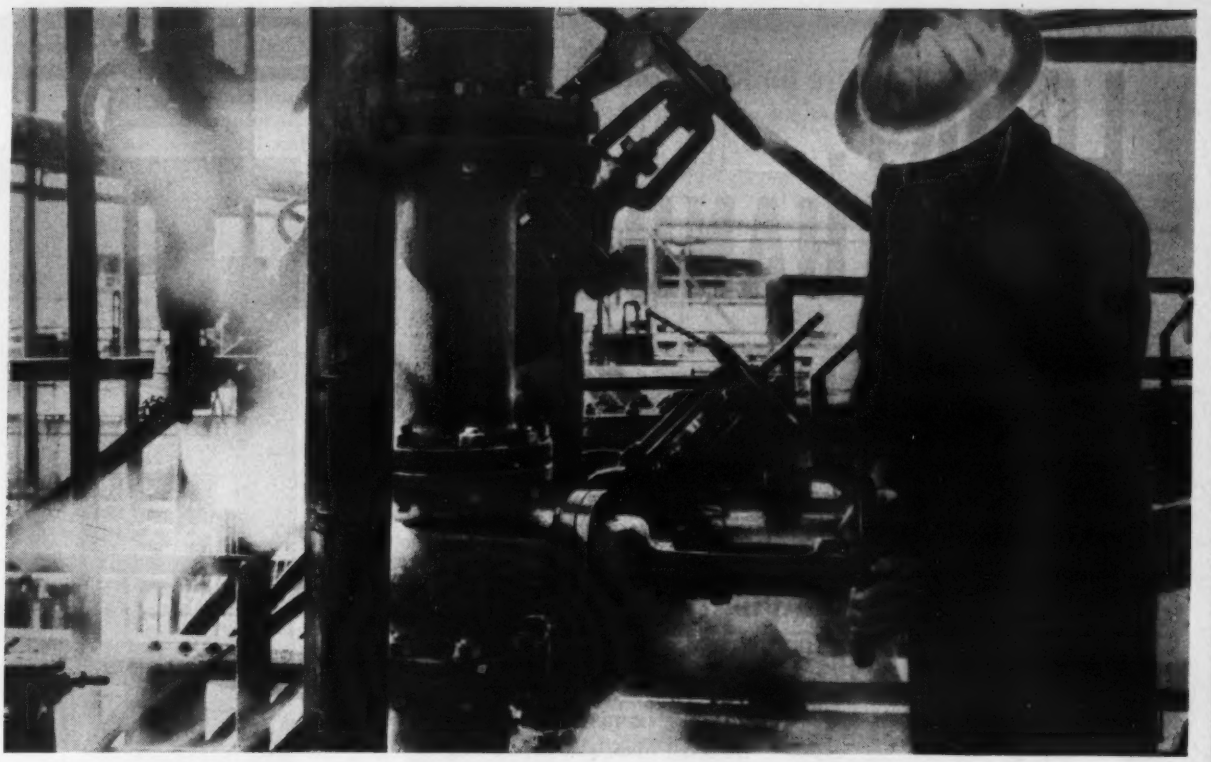
Check 3076 opposite last page.

Penton & Teflon coatings applied to parts up to tank-car size

Announcement is made of facilities, utilizing fluidized bed techniques, for applying coatings of Penton and Teflon. This augments facilities for spray coating with Kel-F, nylon, epoxy, phenolic, acrylic and vinyl. Parts up to tank-car size can be accommodated. Items coated include blenders, tanks, vats, agitators, conveyors and thermowells.

(For further information on application of coatings contact General Plastics Corporation, 165 Third Ave. at East 26th St., Paterson, N. J.)

Check 3077 opposite last page.



30% nickel stainless valve holds off sulfuric acid 14 months

Outlasts others by better than 2 to 1

Handling enough hot sulfuric acid sludge to ruin at least two ordinary valves, this Crane gate valve needed only minor repairs after 14 months. Other valves lasted six months . . . some only three. Here is what helped make the difference:

Stainless alloy plus design

All acid-exposed parts of the valve were cast from "Craneloy 20"*. This 30% nickel, 20% chromium alloy containing molybdenum and copper effectively resists a wide range of hot sulfuric acid concentrations. It also resists certain other mineral acids and many oxidizing and reducing media.

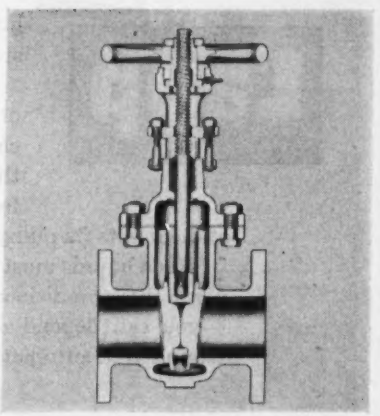
The design of the valve incorporates a special split-wedge disc construction. This minimizes the possibility of galling, reduces wear on seating faces while providing for tight shutoff.

Where Can Nickel Stainless Steel Castings Help You Conquer Corrosion?

In valves, fittings, instrument parts or special equipment operating in corrosive atmospheres, stainless castings offer an excellent opportunity to hold down replacement costs and downtime. So, whether your problems involve chemical corrosion . . . or a punishing combination of corrosives, heat and shock . . . a suitable nickel-containing casting alloy probably can help.

Would you like further comprehensive information? Our new 64-page booklet "Heat- and Corrosion-Resistant Castings — Their Engineering Properties and Applications" is yours for the asking.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N.Y.



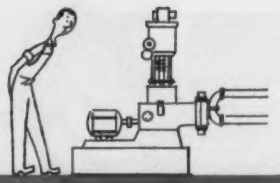
Crane Combines Corrosion-Resisting Alloy, Wear-Avoiding Design. High nickel and chromium contents of the alloy, combined with copper and molybdenum, afford outstanding resistance to sulfuric acid and other corrosives. Split-wedge disc closure enables parts to seat with lighter-than-average pressure . . . minimizes critical wear and galling. *Crane Co. trademark

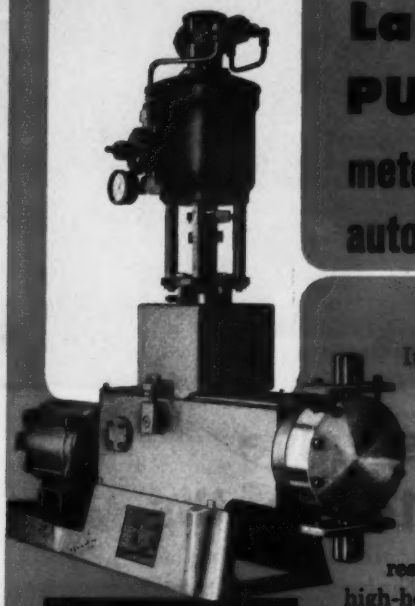
INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Check 3078 opposite last page.

LOOK... NO HANDS!





Lapp PULSAFEEDER meters liquid flow automatically!

It's strictly hands off with automated Pulsafeeders working in your process. These dependable pumps give you *automatically* controlled metering of liquids. They do it accurately and without resort to constant level controls, high-head tanks, measuring tanks or stuffing box pumps.

Here's how it works: A pneumatic or electronic instrument senses a change in the process condition. It then sends a signal to the Pulsafeeder, which interprets the signal and corrects its pumping rate *automatically*.

When liquids must be metered in proportion to changing process conditions—*and* in heavy production service—you can depend on the Lapp Pulsafeeder . . . the *trouble-free* automatic metering pump!

Lapp

A NOTE on your letterhead will bring you Catalog 59 quickly. This new, complete, 28-page data book is chock-full of information on applications, specifications and descriptions of Pulsafeeders of a multitude of capacities and constructions. Write today . . . Lapp Insulator Co., Inc., Process Equipment Div., 1307 Poplar Street, LeRoy, New York.

Check 3079 opposite last page.

CHEMICAL PROCESSING CORROSION CONTROL . . . 7th Annual Feature

High gloss of urethane coatings contrast markedly with uncoated piping and framing (bottom of tower) in the light oil recovery plant. Plant was color keyed with urethane coatings, which have high color durability

Double service life expected with URETHANE COATINGS

Applied in eight different colors on Brooklyn plant, coatings have not been affected by petroleum, corrosive vapors or salt air

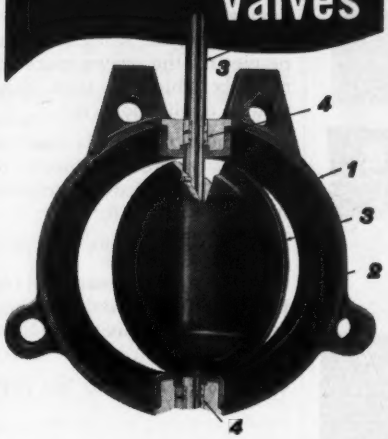
One of the outstanding properties of urethane coatings is their ability to remain totally unaffected by petroleum. An example of how a plant has used this property to maximum advantage is shown in decision of The Brooklyn Union Gas Company to use urethane coatings for its light oil Greenspoint recovery plant in Brooklyn, N.Y.

In the process at the plant, light oils are removed from gas by passing it through towers filled with metal turnings over which scrubbing oil flows. This removes the light oils containing benzol and other hydrocarbons. Scrubbing oils are then debenzolized and reused.

Light oil plant is subject to many of the adverse conditions which limit the service life of most coatings and often prevent the use of color coding of equipment. When the plant is in use, the two 60′ scrubbing towers are subject to the

PACKED with COMPETITIVE ADVANTAGES

ROCKWELL Resilient-Seated Butterfly Valves



1 Less weight, space and cost: Valve face-to-face, overall height and weight are one-fourth to one-eighth those of gate valves. Cost less initially and are easier to install.

2 Drop-tight, leakproof closure. Resilient elastomer liner forms positive seal with disc. Liner removable on the job.

3 Disc and shaft assembly designed for highest rated pressure under most severe operating conditions; always operable manually or automatically.

4 True close bearing fit for shaft; non-leaking, non-galling, corrosion-resistant.

5 And what is quite obvious: the streamlined, self-cleaning design that eliminates cavities and voids in body; low pressure drop; no fouling. Valve can be installed in any position.

Bulletin 590X gives all the powerful facts. Write for a copy.

W. S. ROCKWELL COMPANY
2200 Eliot St. • Fairfield, Conn.

Made and sold in Europe by
COCKBURNS, Ltd. Glasgow S.W.2. Scotland

Check 3080 opposite last page.

spillage of scrubbing oils which attack conventional coatings. In addition to oil spillage, two other corrosive conditions had to be overcome. These are vapors from nearby metal industries and a salt water atmosphere.

In October 1959, the traditional black and gray finish of the plant was transformed into a eight-color system of towers, piping and structures under a plan of color identification.

Before specifying urethane coatings, they had been subjected to two tough tests. To test chemical resistance, a urethane coated rod was submerged in crude light oil. After two weeks submerging, the coating was completely unaffected. Then outside of a steam turbine was coated with urethane. After three weeks, no loss of color could be detected even though the turbine temperatures ranged from 280-380°F.

Because of the exceptional toughness and corrosion-resistance of urethane, it is expected that service life of coatings will be twice that obtained with previous materials. This should result in considerable savings, not withstanding the higher cost of the urethane products, especially when the cost of labor is considered for an application of this type. Total labor cost for the labor project was about $9000 or about 75% of the total cost of $12,000.

Surface area consists primarily of two 60′ scrubbing towers, three distillation towers and related apparatus with connecting piping, supports and fences. It was calculated to be 60,000 sq ft of surface.

Project involves four steps: Previous flaking paint and rust were removed. Urethane red primer was then applied, followed by the first and second coats of urethane. In some cases, the first coat could be applied as soon as two hours after application of the primer. Use of several colors and the windy location of much of the work, necessitated brush application for entire job.

Urethane coatings solidify

Life in these excited states...

"Have you seen the pipe inspector?"

How Ace keeps you out of the tight spots

We admire men who jump right into the tough problems, but our business is eliminating problems completely. That is, problems of corrosion and contamination in piping, valves, pumps, tanks, and the like. Good equipment keeps you always in the clear. Our 108 years of experience is at your service.

Ace chemical-resistant rubber-lined steel pipe best for high-pressure, big sizes, or abrasives. Pipe, fittings and valves 1½ to 24".

Highly efficient *WE* pump. Capacity to 360 gpm. Cast iron, fully protected by top quality, chemical resistant hard rubber lining.

Design assistance and facilities for molding special fittings, pump parts, etc., of plastics or hard rubber. Also large hand-fabricating facilities.

Variety and quality to match *any* plastic piping. Riviclor PVC, Ace-Ite rubber-plastic, Parian poly, Ace Saran, Tempron high temperature nitrile, hard rubber-lined steel.

ACE *chemical resistant equipment*
BY AMERICAN HARD RUBBER COMPANY
DIVISION OF AMERACE CORPORATION
ACE ROAD • BUTLER, N.J.

See ACE equipment in Chemical Engineering Catalog

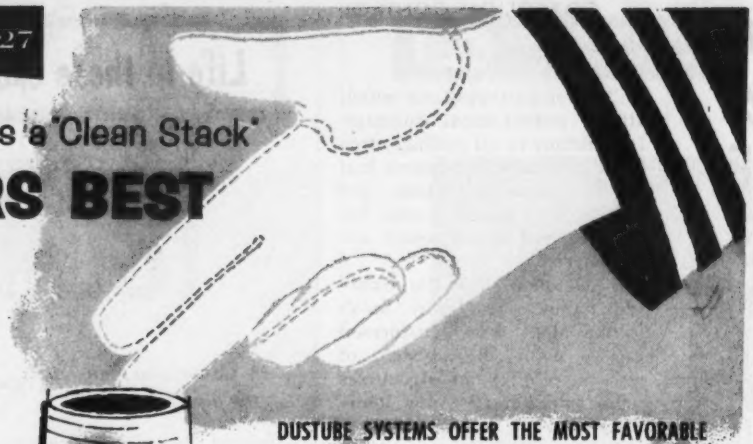
Check 3081 opposite last page.

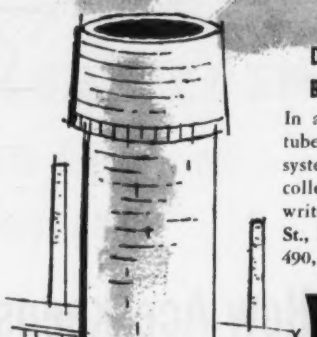
EXECUTIVE REPORT #27

When the Code Requires a "Clean Stack"

CLOTH FILTERS BEST

And Wheelabrator® Dustube® Collectors are the most efficient and economical way to filter with cloth. Dustube systems will collect dust and fumes regardless of concentration or particle size, with collection efficiencies above 99% by weight and 95% by discoloration test. By using appropriate synthetic filtering fabrics, Dustube systems are successfully filtering corrosive and abrasive particles, at temperatures up to 550° F in many applications.





DUSTUBE SYSTEMS OFFER THE MOST FAVORABLE BALANCE OF COST AND COLLECTION EFFICIENCY

In a wide variety of applications, Wheelabrator Dustube Collectors have proven to be the most economical system capable of delivering the required collection efficiency. For engineering data write to Wheelabrator Corp., 478 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
DUST AND FUME CONTROL

Check 3082 opposite last page.

INDUST **RESIN BONDED FIBER GLASS**

DEFIES CORROSION DAMAGE

Research over many years has equipped INDUST engineers with special formulas to meet practically every condition for fume and dust ventilating systems.
Do you need strong acid or alkali resistance? . . . We can give it to you . . .
How about temperatures of 230°F. or higher? We can handle them . .
Great structural strength? . . .
We have it.

Send for booklet.

INDUST
102 BERGEN TURNPIKE NORTH BERGEN N.J.
PLASTICS DIV. OF INDUSTRIAL SHEET METAL WORKS

Check 3083 opposite last page.

through a chemical reaction. The isocyanate reacts with the resin component of the system to produce a hard, glossy finish. Isocyanate and resin are packaged separately and may be applied up to eight hours after the components have been mixed together. Chemicals supplied for this system were developed to be completely non-toxic, with no irritional vapors generated by the isocyanate during the mixing or application phases.

Because the urethane coatings dry to touch in about four hours, they are subject to less damage from airborne grit and other contaminants. This fast-drying time also facilitates scheduling the work and maneuvering the crews more efficiently which, in turn, helps reduce application cost.

(Urethane chemicals used in coatings were produced by Mobay Chemical Company, Inc., Pittsburgh 5, Pa.)

Check 3084 opposite last page.

(Coatings were supplied by Better Finishes and Coatings, Inc., 268 Doremus Ave., Newark 5, N.J.)

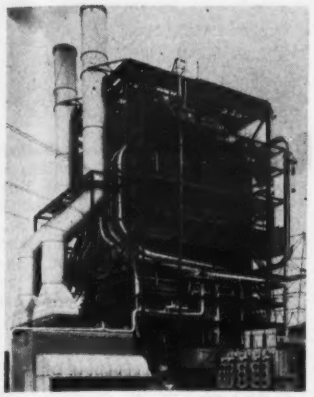
Check 3085 opposite last page.

Porcelain enameled steel has marked success handling corrosives

For such applications as conveyor screws for chemical handling, lagging for boiler houses and other products which must withstand the effects of heat, corrosion and abrasion — porcelain enameled steel is scoring high.

Porcelain enamel is basically a glass coating which is formed by fusing inorganic materials to a steel base. It is normally sprayed, in liquid form, onto the formed metal. It is then dried and fired at high temperature until the coating fuses into the metal and forms an inseparable bond. Dip application is also possible.

The ability of porcelain enamel to resist the effects of corrosion and weathering is one of its prime attributes. Most grades will resist organ-



Typical example of boiler house which uses porcelain enamel steel as lagging

ic solvents and mild alkalis with a pH of 7 to 10. Certain special grades are highly resistant to most acids, including both nitric and sulfuric. It is this ability which has brought about the many boiler lagging applications now in process. Thermal properties of porcelain enamel on steel make it ideal for coatings which must withstand temperatures ranging as high as 1000°F. Burners and areas adjacent to flame are commonly coated with porcelain enamel. In addition, its thermal shock resistance makes it impervious to sudden temperature drops of as much as 350°F.

Porcelain enamel has a Sward rocker hardness of 100 and low coefficient of friction.

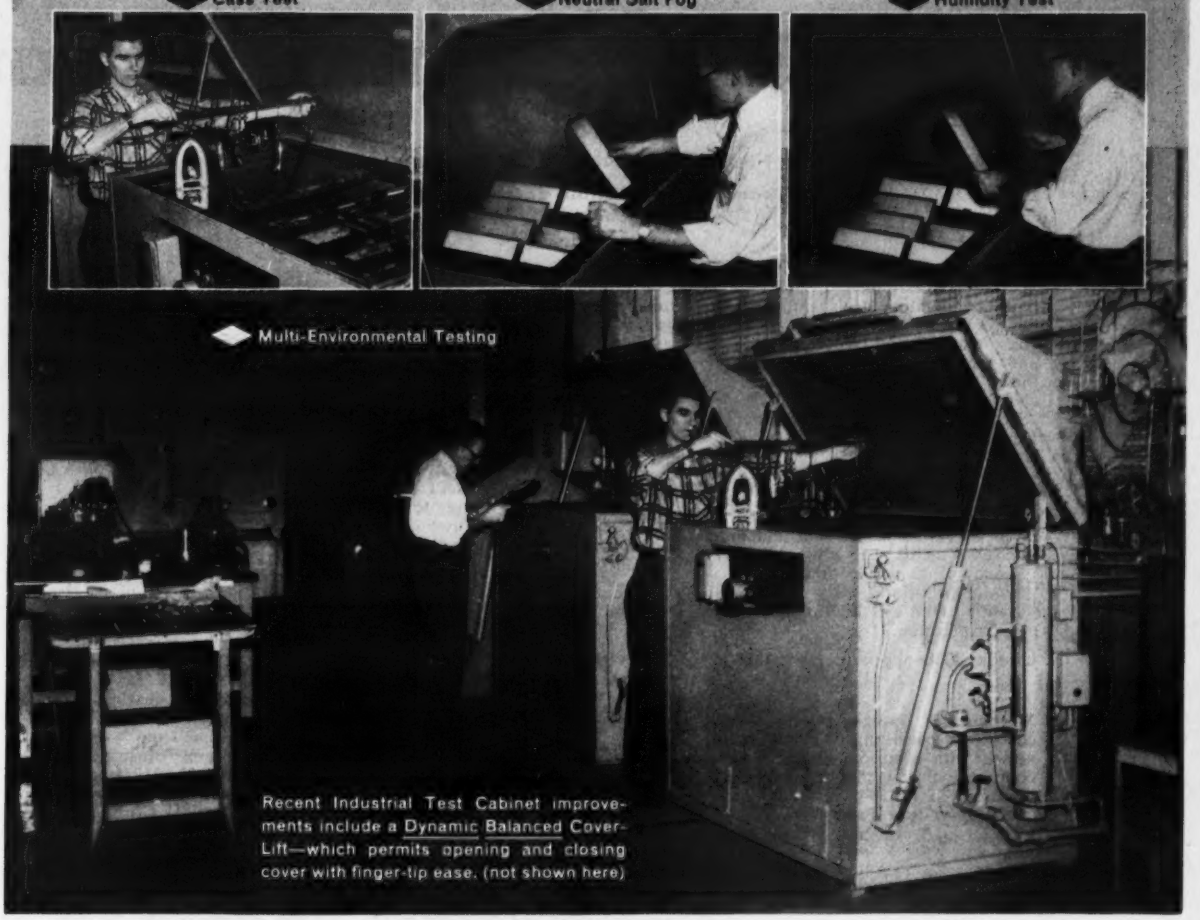
(Porcelain enameled steel is product of Avondale Marine Ways, Inc., New Orleans 8, La.)

Check 3086 opposite last page.

". . . regarding your sprinkler system."

Mark Larkin, Electra Mfg. Co.

American Motors Fights Corrosion with INDUSTRIAL Test Cabinets


Cass Test
Neutral Salt Fog
Humidity Test
Multi-Environmental Testing
Recent Industrial Test Cabinet improvements include a Dynamic Balanced Cover-Lift—which permits opening and closing cover with finger-tip ease. (not shown here)

Rigid accelerated corrosion tests show reliability of Type 411 Cabinets

Corrosion resistance comes under conscientious control at American Motors. Typical of their emphasis on serviceability and long life for the RAMBLER product is their attention to the environmental testing of plated and painted parts.

Among recent test equipment additions to their production test facility at Kenosha, Wisconsin, were three of our new Type 411 Corrosion Test Cabinets. Particularly suitable for this auto manufacturer's needs, Type 411 is versatile enough to meet all the essential requirements for neutral salt fog, humidity and "Cass" corrosion tests.

The vulcanized, rubber-lined cabinet is of double wall construction to provide uniform temperature within the test area. All saturation and heating processes are under positive control. Relative humidities of 95 to 100% from ambient temperatures to 125° are routine.

Close cooperation with government and the military; ASTM, AES, and conformity to most federal and commercial requirements, specifications and procedures have placed the new INDUSTRIAL Type 411 Test Cabinets in demand . . . *wherever* environmental simulation and accelerated corrosion tests serve improved quality control standards.

SEND FOR NEW LITERATURE

CP-180

INDUSTRIAL

INDUSTRIAL FILTER & PUMP MFG. CO.

5908 Ogden Ave., Cicero 50, Illinois

PRESSURE FILTERS ♦ ION EXCHANGERS ♦ CORROSION TEST CABINETS ♦ PUMPS ♦ WATER & WASTE-TREATING EQUIPMENT

Check 3087 opposite last page.

CHEMICAL PROCESSING CORROSION CONTROL ... 7th Annual Feature

Corrosion Technical Literature

Here is information on new bulletins and brochures containing valuable data to help you in fighting corrosion

Specialty steels such as various types of stainless steels and other alloys, is subject of 45-minute color film. Story of the science and art that goes into producing these corrosion-resistant steels is covered. Information on film, "Specialty Steels," can be obtained from Crucible Steel Company of America, Pittsburgh 22, Pa.

Aluminum alloy guide of 24-pages offers useful information to aid in the selection of such alloys for a variety of applications. "Olin Aluminum Products" — Metals Division, Olin Mathieson Chemical Corporation.

Check 3088 opposite last page.

Mechanized storage system for corrosives, consisting of glass-lined vessels with a bottom unloader or cone bottom and other equipment, is described in 16-page Bul MU-107—Harvestore Products Permaglas Div., A. O. Smith Corporation.

Check 3089 opposite last page.

Coal-tar protective coatings are described in detail in 13-page illustrated booklet. General properties of coatings, chemical resistance, specifications, coating thickness and photographs of typical applications are included. Bul CAC-11-958 — Plastics and Coal Chemicals Div., Allied Chemical Corporation.

Check 3090 opposite last page.

Interleaving paper for flat sheets of aluminum that inhibits water stain is discussed in two-page bulletin. Tissues are impregnated with corrosion inhibitor compounds. "Alumitex"—Orchard Paper Company.

Check 3091 opposite last page.

Eight-year corrosion tests on wrought iron and structural steels in salt water and lake water environments are summarized in 12-page report issued by A. M. Byers Company.

Check 3092 opposite last page.

Concrete floors, how they can be repaired and prepared prior to the application of a corrosion-resistant coating, is subject of 12-page bul 1019—Carboline Company.

Check 3093 opposite last page.

Resistance of polyethylene pipe to 32 corrosive materials is given in chart. Resistance at 75 and 120°F is tabulated. "Resistance of polyethylene Pipe" — Semet-Solvay Petrochemical Div., Allied Chemical Corporation.

Check 3094 opposite last page.

Magnesium gratings that have outstanding resistance to caustic corrosion are discussed in catalog. Gratings are strong and light in weight. Cat on Magnesium Gratings—Irving Subway Grating Co., Inc.

Check 3095 opposite last page.

Acid-proof rubber linings which provide protection against corrosion, contamination and abrasions are illustrated and discussed in 12-page bulletin. Information is given on lining recommendations for a variety of different surfaces. Bul 7115 — Manhatton Rubber Division, Raybestos-Manhattan, Inc.

Check 3096 opposite last page.

Corrosion-resistant valves of gate, globe and check types are illustrated and described in 65-page catalog. Valves are made from a variety of different alloys and materials. Complete material specifications for each valve are given. Catalog SS-102—Pacific Valves, Inc.

Check 3097 opposite last page.

Corrosion data survey illustrates the behavior of about 1500 corrosive environments when in contact with about 50 construction materials. Information can be readily obtained on best type of material to use for a particular stream. Book is available at a price of $50 per copy from The Shell Development Company, Emeryville, California.

Diaphragm valve of Grinnell-Saunders type made of Penton for corrosion resistance at elevated temperatures is discussed in eight-page bulletin. Resistance of Penton to a large number of chemicals is given. Bul on Penton Diaphragm valves—Grinnell Company, Inc.

Check 3098 opposite last page.

Activated epoxy coating that provides a high degree of durability against abrasion and corrosion is described in two-page bul P-42—The Wilbur & Williams Company, Inc.

Check 3099 opposite last page.

Custom-applied coatings based on such materials as Teflon, Kel-F, epoxy Resins and silicones are discussed and illustrated in 10-page bul GD-5030—Industrial Coatings Division, The National Glaco Chemical Corp.

Check 3100 opposite last page.

Floors designed to withstand wear and corrosion are discussed and illustrated in 40-page architect's file folder No. 23-G—Pennsalt Chemicals Corporation.

Check 3101 opposite last page.

Reinforced plastic material and how it is being used to advantage for specific parts in pumps handling corrosives is discussed in 12-page bulletin. "Fianite" — The Deming Company.

Check 3102 opposite last page.

Pipe wrap tapes for control of corrosion are discussed in six-page bulletin. Information is given on properties of each tape, along with coverage data. Bul 102-59-1—Permacel.

Check 3103 opposite last page.

Protective coating which combines best features of epoxy resin with selected coal tar pitches is described in two-page bulletin "Poxitar"—Inertol Co., Inc.

Check 3104 opposite last page.

Butyl rubber is covered in detail in 12-page bulletin. Information is given on chemical resistance, flexibility, abrasion resistance and other properties. "Enjay Butyl"—Enjay Company, Inc.

Check 3105 opposite last page.

Canned pumps for leak-proof pumping of corrosive, toxic, explosive, and other problem fluids are described and pictured in eight-page bul 1050-4 — Chempump Division, Fostoria Corporation.

Check 3106 opposite last page.

Cast alloys in the carbon, low alloy, stainless and nickel groups are shown on reference chart. Information is given on 55 alloys. Alloy Reference Chart—Lebanon Steel Foundry.

Check 3107 opposite last page.

Protective coating brochure of eight-pages describes and illustrates research undertaken by manufacturer to develop improved coatings. A number of coatings design to withstand specified corrosive conditions are discussed. "Some Facts About Prufcoat Research" — Prufcoat Laboratories, Inc.

Check 3108 opposite last page.

Alloy pumps available in such metals as stainless steel, nickel, Monel, modular iron, and Ni-resist are discussed in eight-page bulletin. Pumps can be operated at up to 100% rated speed when handling thin corrosive liquids. Bul on alloy pumps—Viking Pump Company.

Check 3109 opposite last page.

Water problems, from pre-treatment to waste disposal, and how they can be solved are discussed in 24-page brochure "Industrial Water Consulting Service" can be obtained on letterhead request from Hall Laboratories, Div. of Hagan Chemicals & Controls, Inc., Hagan Center, Pittsburgh, Pennsylvania.

Protective coatings for steel, masonry floors and industrial equipment are covered in eight-page bulletin. The asphalt base clay emulsion coating described has given excellent service under severe conditions for long periods. Bul 1-SR-4-60—Industrial Division, The Flintkote Company.

Check 3110 opposite last page.

Stainless steels and how they serve the petrochemical field is subject of 26-page illustrated booklet. Valuable information is given on type of alloy to use for a particular chemical or location in a petrochemical plant. For example, information is given on what alloy should be used for various sections of a fractionating column. Bul PO7058—Armco Steel Corporation.

Check 3111 opposite last page.

Fabrication of stainless steel is explained in detail in 162-page handbook. Information is given on correct procedures for all of the various operations involved in fabricating stainless. "The Fabricators Handbook"—Crucible Steel Company of America.

Check 3112 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Fluid control products such as packless valves, sampling cylinders and corrosive gas pressure regulators are discussed in 32-page catalog GC959—Hoke Incorporated.

Check 3113 opposite last page.

Protective coating system that saved 1/3 the usual cost of labor when applied to a plant in Texas is discussed in four-page brochure. Plant is coated in color, combining functional beauty and economy. Bul on Texas Alkyls Inc. plant—Rowe Products, Incorporated.

Check 3114 opposite last page.

Nickel-clad steel corrosion guide tabulates the resistance of the metal to a variety of corrosives at specified temperatures and concentrations. "Corrosion Guide"—Bart Manufacturing Corporation.

Check 3115 opposite last page.

Have you checked your ceilings recently?

It pays to keep a sharp eye on the overhead structures in your plant, for corrosive fumes and gases can readily damage poorly protected walls, fixtures, ceilings, and other structural members. Unless detected in time, and corrective action taken promptly, such damage can be severe and costly.

So it's wise to make periodic inspections of those higher areas. And if you find "trouble spots" where present coatings are not giving adequate protection, Tygon Paint, with its exceptionally broad range of corrosion-resistant properties, is usually the recommended answer.

We don't claim that Tygon provides "universal" corrosion protection. Engineers know there is no "all-purpose" coating. But just about everywhere that protective coatings must withstand the effects of corrosive fumes and chemicals, specialized Tygon Coatings are meeting the challenge — providing longer service at lower long-term cost.

Send for this Tygon Data Book today. It contains complete application details plus helpful information on performance of Tygon Paint over a wide range of corrosives.

PLASTICS AND SYNTHETICS DIVISION

U. S. STONEWARE
AKRON 9, OHIO

444-F

Check 3116 opposite last page.

Viton-lined pumps for combating heat and corrosion

Announcement is made of centrifugal pumps available with Viton linings. Viton synthetic rubber is an elastomer with outstanding resistance to heat and corrosion. It will withstand a wide range of corrosive chemicals, fuels, oils and solvents. For example, it resists concentrated nitric acid, hot aqueous hydrochloric, hot sulfuric, aqueous HF.

Pump is available with Hastelloy B, Hastelloy C or Carpenter 20 shafts. It features a removable stuffing box that is interchangeable with a mechanical shaft seal. Pump is available in eight sizes, with capacities up to 400 gpm.

(Viton-lined pump is product of Industrial Filter & Pump Mfg. Co., 5900 Ogden Ave., Cicero, Ill.)

Check 3117 opposite last page.

Temperatures to 4000°F suitable for products of silicon carbide

Techniques developed for fabrication into complex shapes

Processing engineer will be aided in solving some troublesome problems of maintenance and corrosion through the development of techniques for fabricating self-bonded silicon carbide into tubes, plates, rods, and complex shapes. Material defies the attack of most metals, gases and acids. Its resistance to oxidation is so outstanding that long intervals of use at 3000°F in an oxidizing atmosphere have little or no effect. It is capable of staying in use up to 4000°F in an inert or reducing atmosphere. Silicon carbide has high thermal conductivity, high flexural strength, impermeability and extreme resistance to abrasion.

(KT Silicon Carbide is product of the Carborundum Company, P.O. Box 337, Niagara Falls, N.Y.)

Check 3118 opposite last page.

ENGINEERED TEFLON* PRODUCTS
for Chemical Processing

BEST AT EXTREME TEMPERATURES WHERE CORROSIVES ARE PRESENT

Garlock Teflon-jacketed Gaskets give you the advantage of using Teflon without sacrificing resiliency and deformability . . . particularly important on your glass-lined process equipment, light metal flanges, and glass pipe flanges and fittings. Garlock offers four basic designs—slit envelope, milled envelope, formed shield, double jacket—and a wide selection of filler materials and thicknesses. Catalog AD-154.

Garlock SOLID Teflon and Teflon-lined Expansion Joints, exposed to the most reactive chemicals, guard costly piping against pressure surges from pumps, compressors and engines . . . reduce flange breakage, prevent stress, compensate for misalignment. Catalog AD-137.

Garlock LATTICE-BRAID† Teflon Packings are perfect on pumps and engines in petrochemical, oil and gas service. They are strong, long-lasting, chemically inert. Withstand temperatures ranging from −120°F to +500°F. Less gland pressure is required to effect an adequate seal, resulting in longer sleeve and packing life, less downtime. Catalog AD-131.

Garlock CHEMISEAL† Mechanical Seals possess greater immunity to corrosion and are more economical than any other design offered. Easy to handle and install, do not score shafts, engineered to give a life expectancy many times that of other seals. Available in standard sizes to fit all pump shafts ⅞" to 2⅛" shaft. Seals against all media in pressures to 100 psi at 75°C or 75 psi at 100°C. Catalog AD-164.

GARLOCK

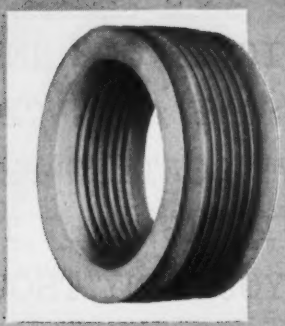
For more complete information, call your Garlock representative at one of Garlock's 26 sales offices and warehouses throughout the U.S. and Canada. Or, write Garlock Inc., Palmyra, New York.

Canadian Div.: Garlock of Canada Ltd.

Plastics Div.: United States Gasket Company

Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded & Extruded Rubber, Plastic Products

†Registered Trademark
*DuPont Trademark for TFE Fluorocarbon Resin

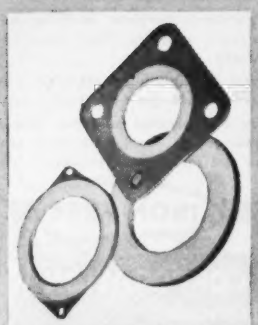


Teflon Expansion Joints protect expensive piping from damage due to stress, misalignment . . . resist solvents, acids, caustics to 125 psi.

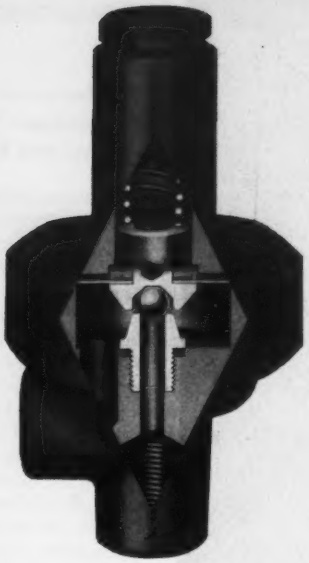
CHEMISEAL Mechanical Seals can be installed quickly and simply, offer leakproof sealing without shaft wear . . . resist most reactive chemicals.

LATTICE-BRAID Teflon Packing lasts far beyond the limits of other packings . . . gives maximum service over wide range of temperatures, pressures. Only Garlock can give you LATTICE-BRAID.

Teflon-jacketed Gaskets offer the advantage of applying Teflon without the loss of resiliency . . . ideally suited to pipes, flanges in chemical processing.



For more information on product at left, specify 3119 see information request blank opposite last page.



THIS PREMIUM RELIEF VALVE PROVIDES ABSOLUTE SAFETY IN CORROSIVE SERVICE

- The Milton Roy full-lift design assures immediate and positive relief when the set pressure is reached, yet there's no chattering or leakage as the relief valve approaches its set pressure.
- Continued leak-free operation is assured even after the valve has opened in corrosive service, because topworks are completely isolated from the process stream by a Teflon diaphragm.
- Wetted parts are available in steel, 316 stainless, Carpenter 20 stainless, Hastelloy "C" or "B", or PVC. Sizes range from ¼" up for pressures to 1500 psi. Back pressure valves are also available.

For complete information, request Bulletin 357-2 from Milton Roy Co., 1300 East Mermaid Lane, Philadelphia 18, Pennsylvania.

milton Roy
CHEMICAL INSTRUMENTATION SYSTEMS

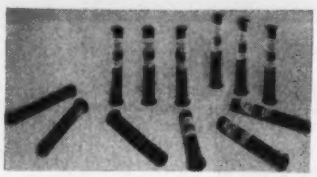
Controlled Volume Pumps • Quantichem Analyzers
Chemical Feed Systems • pH Instruments

Check 3120 opposite last page.

Teflon protector tubes prevent corrosion of exchangers

Erosion and dewpoint corrosion at the tube sheet opening of heat exchangers and condensers are prevented by Teflon protector tubes.

Tubes, tapered at the end to reduce turbulence, are easily installed by means of a hand press fit. They are inert to all chemicals and acids except molten alkali metals and fluorine at elevated temperatures and pressures. Tubes withstand temperatures from —100 to 500°F. They are nonaging and non-flammable.



Protector tubes are available in a variety of sizes to meet specific requirements

(Fluoroflex-T protector tubes are product of Resistoflex Corporation, Roseland, New Jersey.)

Check 3121 opposite last page.

Joint leakage prevented by coupling gasket for lined pipe

One of the major problems of producing certain types of plastic-lined pipe on a commercial basis or cement-lined pipe has been that of providing a satisfactory method of joining the pipe. Recently developed coupling gasket, used with coupling, is said to solve that problem.

Style E gasket (black) used for coupling light-wall pipe with roll groove (left) and std wt pipe with cut groove (right)

Gasket has single-piece solid design, with compression sealing rib that completely fills the

IT COSTS YOU NOTHING
TO INVESTIGATE OUR NEW AND EXCLUSIVE ADVANCES IN PROTECTIVE COATING PRODUCTS AND TECHNIQUES--YET THEY CAN SAVE YOU MANY THOUSANDS OF DOLLARS. FOR PROOF, WRITE, WIRE OR PHONE COLLECT.

ROWE PRODUCTS, INC.

P. O. Box 618 · NIAGARA FALLS, N.Y. · Butler 5-9348
SPECIALISTS IN PROTECTIVE COATINGS TO THE CHEMICAL AND ALLIED INDUSTRIES SINCE 1921

Check 3122 opposite last page.

KNOX

DIRECT FROM MANUFACTURER To YOU!

Tower Packings

KNOX produces porcelain tower packings from the same composition as is used for high voltage electric porcelains.

Resists high temperatures, fumes, vapors, corrosion, liquids, alkalies and acids.

Non-porous — complete vitrification firing 2300°F. provides zero porosity, thus assuring an indefinite life chemically.

Uniform quality—high chemical purity—iron-free—great mechanical strength—will not crumble.

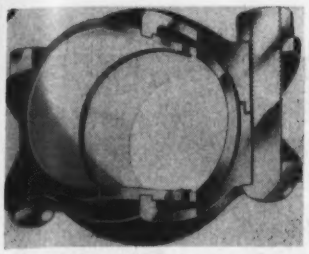
If you're interested in Better Tower Packings at lower Operating Cost, we'll be glad to send more information, prices and samples on request.

IRON FREE

Always Specify KNOX Tower Packings

KNOX PORCELAIN CORPORATION
KNOXVILLE 1, TENNESSEE

Check 3123 opposite last page.



Coupling is placed over gasket to make leakproof, corrosion-resistant joint

void between bare pipe ends. Gasket is used with coupling having tongue-and-groove interlocking mating faces.

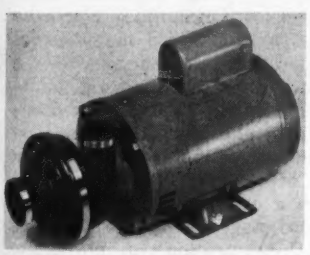
Gasket and coupling will handle services to 2000 psi pressure and temperatures from −40 to 200°F. Gasket is available in sizes up to 6". Installation can be easily accomplished.

(Style E and protection gasket and Rigi-Grip couplings are products of Gustin-Bacon Manufacturing Company, 210 West Tenth Street, Kansas City, Mo.)

Check 3124 opposite last page.

Penton centrifugal pump fights corrosion

Centrifugal pump molded from Penton plastic offers maximum resistance to highly corrosive chemicals such as concentrated sulfuric acid and

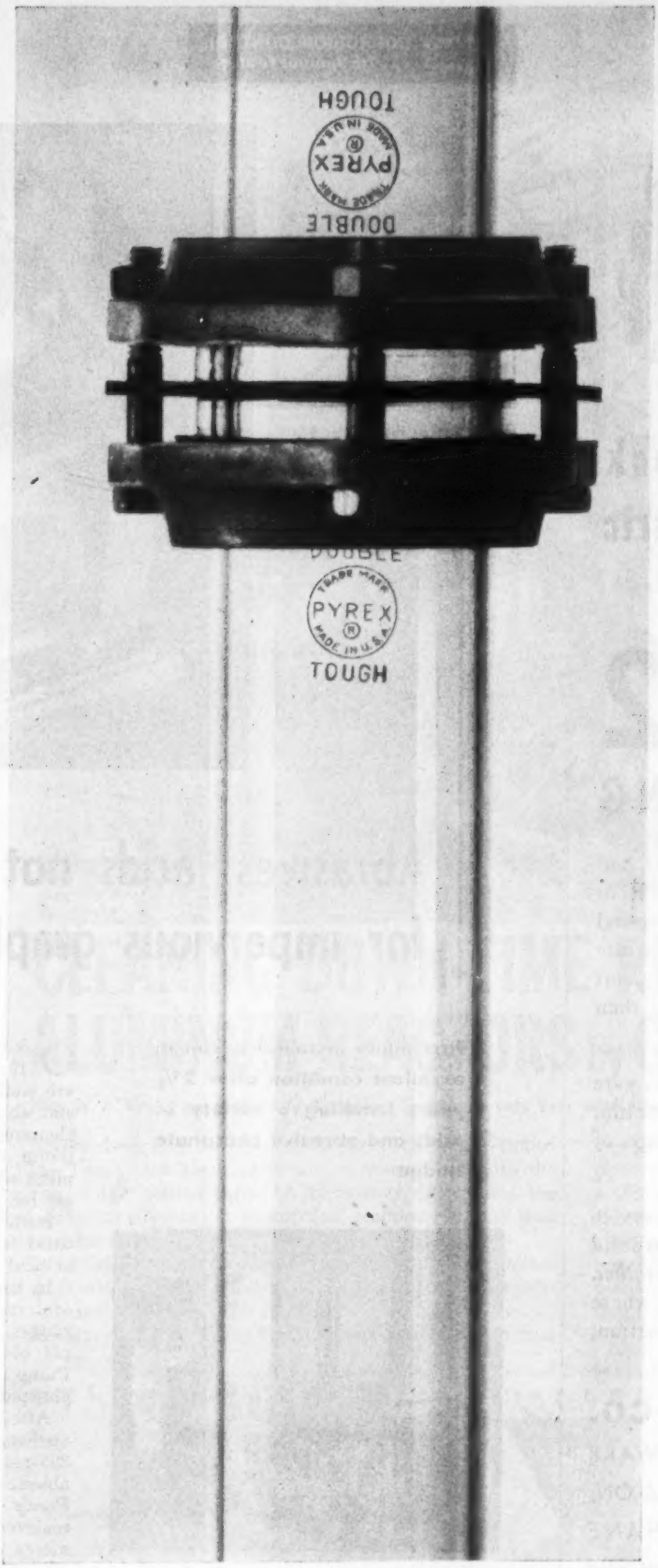


Pump has capacity to 75 gpm

ferricyanide bleach. First size to be produced will be one with a 1¼" inlet, 1" outlet, with capacities ranging from 10 to 75 gpm. It is designed for chemical transfer uses.

(Penton pump is product of Chemtrol, 404 W. Central Ave., Santa Ana, Calif.)

Check 3125 opposite last page.



How to run a simple test study on PYREX® pipe and corrosion

A few hours and a few dollars may be enough to end corrosion in your piping altogether.

Choose a process line where you have the worst corrosion. Put in a length or a section of PYREX pipe. Sit back and let the pipe go to work.

We are positive you'll learn two things from this study.

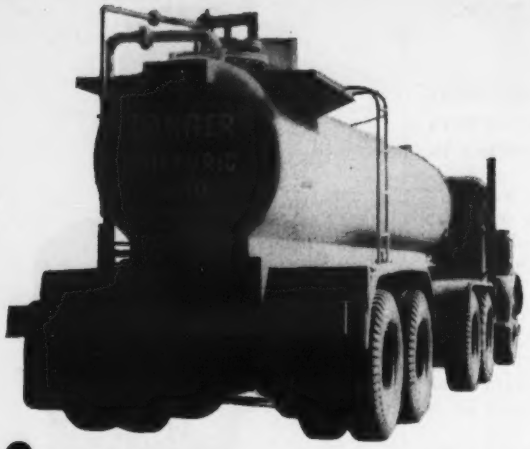
You'll find the PYREX pipe can indeed end your corrosion problems unless you're handling large quantities of hydrofluoric or glacial phosphoric acid, or hot alkalies. Any other chemical or combination of chemicals should slip through without a trace of corrosion.

You'll find that PYREX pipe installs so much more easily and so much faster than most other materials that it is actually one of the least expensive piping materials you can use.

Your local PYREX pipe distributor can show you how to attach this pipe to your present lines—fittings are available for making attachment to any type of process pipe. See our insert in Chemical Engineering Catalog. Or, if you prefer, you can write direct to us for a copy of PE-3, the PYREX Pipe Bulletin. Address: Plant Equipment Sales, 3 Crystal Street, Corning, N. Y.

CORNING GLASS WORKS
CORNING MEANS RESEARCH IN GLASS

Check 3126 opposite last page.



2 year round-the-clock protection against sulfuric acid spill and splash

GACO H-2
HYPALON COATING

Problem: A large Canadian manufacturer had a problem transporting sulfuric acid at 200°F. in its tank trucks from the pickling line to a disposal dump. The fleet of tank trucks must operate around the clock—and the best "acid proof" paint available would last for *only one* trip and then peel off.

Solution: The exteriors of the tank trucks were coated with GACO H-2 Hypalon as a protection against the continual splashing and spillage of acid during loading and unloading.

Result: This coating has now been in service over a full *two years*, with trucks running around the clock, and *shows no signs of deterioration*. GACO liquid Hypalon Coatings start work where ordinary coatings fail. For further information, *write*—we'll forward literature of interest.

GATES ENGINEERING CO.

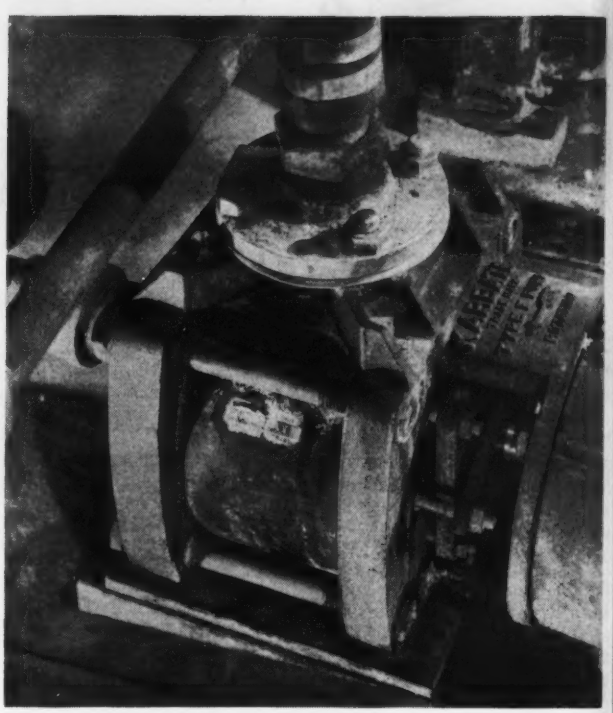
WILMINGTON 99, DELAWARE

GACOTE, NEOPRENE, HYPALON, VINYL, EPOXY, URETHANE*

**Sheet and liquid*

Check 3127 opposite last page.

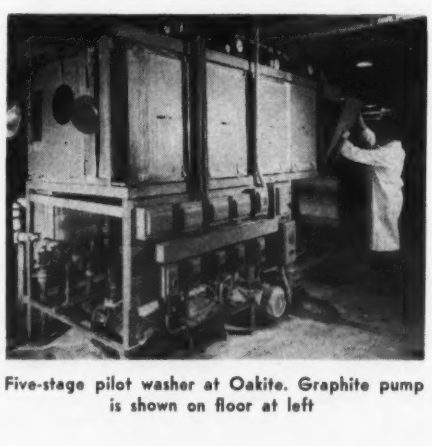
CHEMICAL PROCESSING CORROSION CONTROL ...7th Annual Feature



After more than 2½ years service handling acidic cleaning solutions at Oakite, graphite pump is little the worse for its experience

Abrasives, acids not too tough for impervious graphite pumps

First pump installed is still in excellent condition after 2½ years handling a variety of acids and abrasive phosphate sludge



Five-stage pilot washer at Oakite. Graphite pump is shown on floor at left

Oakite Products, Inc. has found that Karbate impervious graphite pumps are well suited for handling the corrosive and abrasive solutions used in industrial cleaning operations. Oakite tested a pump of this type in its five-stage pilot-plant washer used for its CrysCoat process for applying phosphate coatings.

Initial pump installation was made in third stage of washer, considered most critical from a corrosive standpoint.

In this third stage, phosphate solutions are used. Concentration of phosphate ranges from ½ to 4% by volume, with pH of solutions ranging from 1.5 to 5. Pump was also subjected to abrasive phosphate sludge.

After 2½ years of use, pump is still in operation, delivering exactly the same 205-psi pressure, a positive indication of absence of seal wear or impeller damage. Pump has required no seals or other maintenance except for minor adjustments. It has never leaked and is using its original impellers.

Satisfactory performance of pump led

to the installation of a similar but larger pump in third stage. Original pump was moved to first stage. Here it is subjected to acid, alkaline and solvent emulsion at temperature to 200°F.

Frame-mounted pump has rating up to 1500 gpm, with 110′ head. In Oakite's pilot-plant equipment, spray nozzle sizes and types can be varied and pressure adjusted by means of valves.

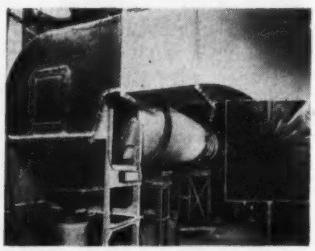
(Karbate impervious graphite pump is product of National Carbon Company, Div. of Union Carbide Corporation, 270 Park Ave., New York 17, N.Y.)

Check 3128 opposite last page.

Solids wet with HCl successfully handled by plastic dryer

Problem: Metal dryer previously used in the processing of various inorganic materials was subject to corrosion, which resulted in contamination of product.

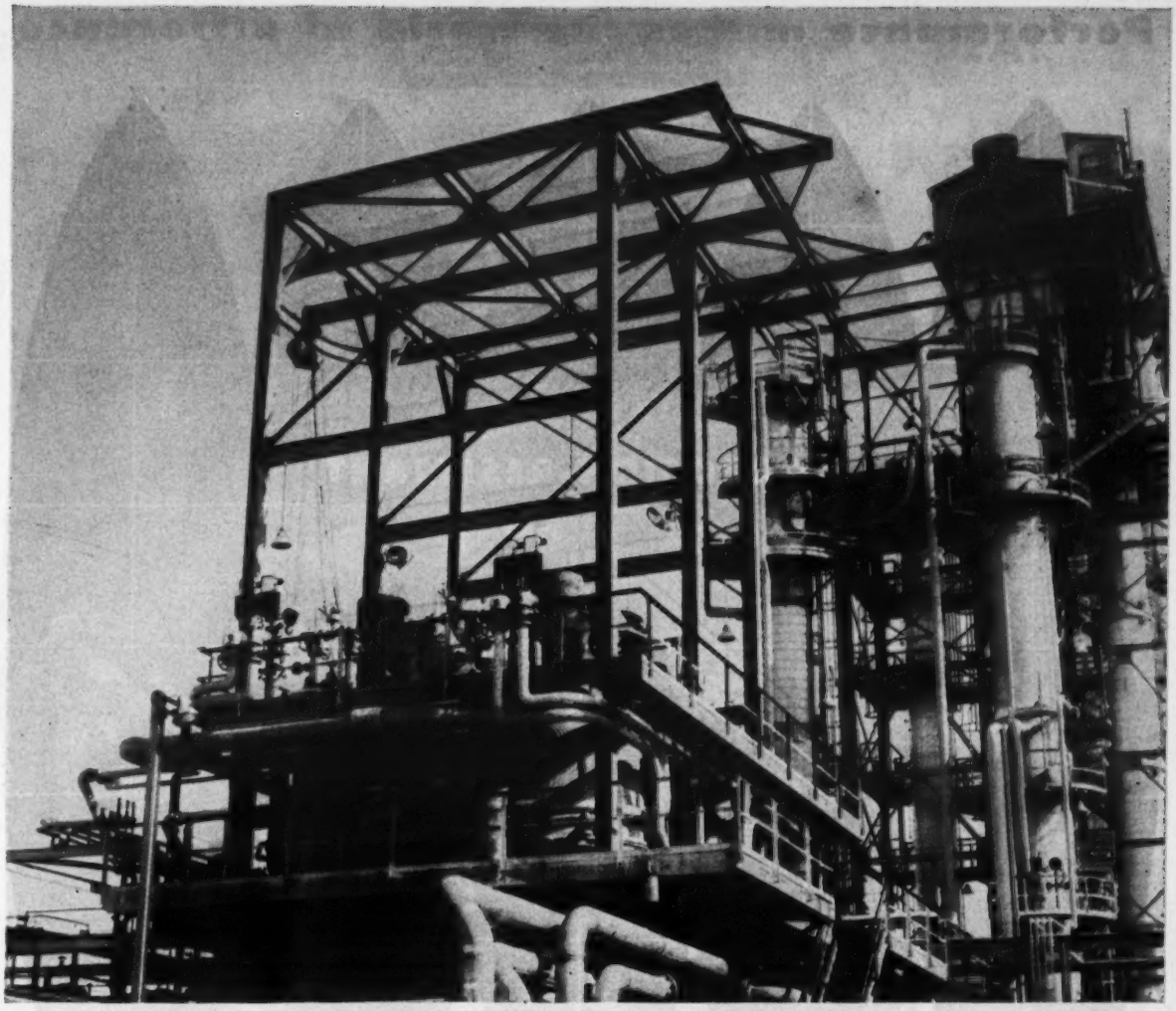
In the dryer, solids wet with HCl are exposed to air heated to 225°F (high limit 290°F). After discharge, vapor



Larger photograph shows complete dryer installation. Smaller inset shows dryer interior

containing free HCl and H_2O passes out through the exit housing where it is separated from the material that is being dried.

Solution: Substitution of glass fiber reinforced plastic construction was suggested as a solution to the corrosion problem. As a preliminary evaluation, a test section one foot long was installed at the point of most severe corrosion. Chlorinated polyester



CLEANING DOWN-TIME REDUCED 69% WITH ALUMINUM REACTORS by GENERAL AMERICAN

How W. R. Grace urea plant in Memphis, Tennessee cuts cost with four 6,750-gallon General American aluminum reactors.

Before designing these units, General American studied the Turbo-Gas-Absorber in a pilot operation 1/65th the size of the needed capacity. Here they determined the maximum efficiency in absorption, reaction rate and heat transfer within the reactor.

In addition, General American developed a special mixer shaft with external bearings—reducing crystal accumulation and wear within the reactor.

Result—the full size reactors are even more efficient than the pilot operation indicated. The interval between cleaning has been lengthened from 14 days to 45 days . . . a 69% reduction.

If you require process equipment, General American engineers will be glad to give technical assistance. You can pre-determine results at our complete East Chicago pilot plant. For complete information, call or write. You'll find *it pays to plan with General American.*

Process Equipment Division—Turbo-Mixer

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street
Chicago 3, Illinois

TURBO-MIXER GENERAL AMERICAN TRADE MARK

Offices in principal cities

Check 3129 opposite last page.

Performance makes the world of difference

Fig. 2453SG—Large Stainless Steel O. S. & Y. Gate Valve for 150 W.P. Fully guided solid wedge disc. Also available with interchangeable split wedge disc — Fig. 2453DG.

Fig. 2433SS — Large Stainless Steel Swing Check Valve for 150 W.P. Bolted flanged cap. Integral seat. Teflon disc and renewable seat ring are available on special order and at extra price.

Fig. 2309—Large Flush Bottom Tank Valve for 150 W.P. Designed for fast draining. Disc opens into tank. Also available with disc opening into valve — Fig. 2310.

Fig. 2107 — Small Stainless Steel "Y" Valve for 150 W.P. Flanged ends, but can be supplied with screwed or socket welding ends. Dimensions conform to latest standards.

To control the flow of corrosive fluids in the most severe services, Powell offers valves that have far greater corrosion, erosion, heat and wear resistance than ordinary valves.

Among the many metals and special alloys in which these valves can be supplied are Stainless Steel, Nickel, Monel Metal*, Hastelloy† Alloys, Ni-resist*, Aluminum, and others to handle the acids, alkalies, organic solvents, and gases encountered in the Chemical and Process Industries.

Just name your valve problem—Powell has the right valve to solve it. For complete information and literature, contact your Powell Valve distributor (there's one in all major cities) or write directly to us.

*Registered trade names of The International Nickel Company. †Registered trade names of Haynes Stellite Company

Powell . . . world's largest family of valves

THE WM. POWELL COMPANY • DEPENDABLE VALVES SINCE 1846 • CINCINNATI 22, OHIO

Check 3130 opposite last page.

resin Hetron 72 was used.

After several months of service, the test section showed no signs of attack. On this basis, a completely new dryer, including the exit gas separator housing, gas entrance and product discharge housing, along with internal dryer lifting flights, was fabricated.

Results: Entire plastic drying unit is free of corrosion after six months service. Interior has suffered only negligible wear from the erosion of solids being dried. Unit has required no external maintenance or painting.

(Plastic dryer was fabricated by duVerre, Inc., Arcade, New York.)

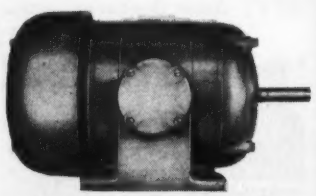
Check 3131 opposite last page.

(Hetron 72 resin is product of Hooker Chemical Corp., Niagara Falls, N.Y.)

Check 3132 opposite last page.

Aluminum, stainless protect motor

Field tests indicate that motor designed for use in particularly corrosive application



Motor can operate in a variety of corrosive conditions

is giving good service. One anodized aluminum gearmotor has operated in a potash mine for two years without indication of corrosion. Other units have given good service when subjected to salt-water corrosion.

Motor frame, end brackets and fan shield are of aluminum. Aluminum is anodized or treated with an epoxy coating, or both. Stainless shaft, cap screws and nameplate can be provided.

(Chemical motor is product of Electra Motors, Inc., Anaheim, Calif.)

Check 3133 opposite last page.

FIGHT FOAM FAST!

with

SAG SILICONE ANTIFOAM

Now, from the laboratories of UNION CARBIDE, come new SAG Silicone Antifoams . . . that *fight foam fast!*

SAG Antifoams were developed after years of research to find the most efficient method of fighting foam. SAG Antifoams are effective in small quantities—often less than 10 parts per million! There are two types: SAG 470 *Emulsion* for aqueous systems; SAG 47 *Fluid* for non-aqueous systems. Only a few cents' worth eliminates thousands of cubic feet of costly, space-eating, storage-killing foam.

You'll like having SAG Antifoams handy. They are shipped to you ready to use and are stable in storage.

TRY SAG! Write for a handy sample today. This coupon makes it easy!

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SILICONES DIVISION Dept. KC-4706
Union Carbide Corporation
30 East 42nd Street, New York 17, N.Y.

Send sample of ( ) SAG 470 emulsion; ( ) SAG 47 fluid; and data on SAG Silicone Antifoams.

Name_____ Title_____

Company_____

Address_____

City_____ State_____

"Union Carbide" and "SAG" are trade-marks of UCC.

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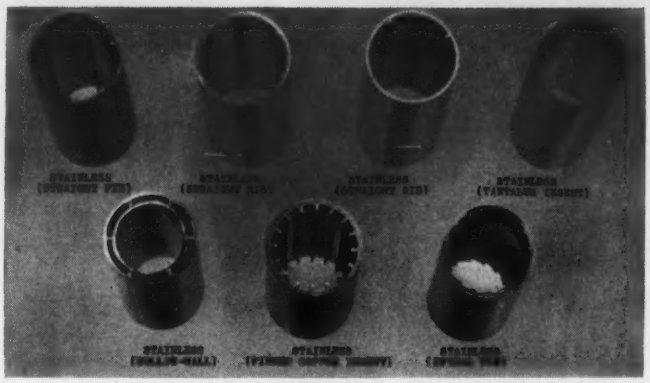


Some of the tube shapes that can be lined with highly corrosion resistant metals such as titanium, tantalum and zirconium

Bi-metal tubing cuts cost of using Titanium, Tantalum, Zirconium

Thin liner of highly resistant but costly metal can be bonded to interior of outer tube made of a lower-cost metal

BYRON B. BURD
Chief Metallurgist
Damascus Tube Company

Processors can now obtain the outstanding corrosion resistance properties of titanium, tantalum, zirconium and other relatively expensive metals without having to pay the high initial cost of these metals. This has been made possible by development of a process, called Flo-Rol, for bonding a thin layer of the highly corrosion resistant metal (0.010 to 0.015") to the interior of a heavier stainless steel tube or other base metal. Process, used with welded tubing, can be employed with virtually any metal in combination with stainless.

In the process, for example, a thin titanium tube is inserted into a heavier wall stainless tube. Tubes are then reduced together so that a permanent mechanical bond is formed between the two metals. Inside diameter is controlled by a mandrel inside tube assembly.

Finished tube has standard tolerance of ±0.002" on diameter and 0.0005" on wall thickness. These are even closer tolerances than can be obtained in draw-bench operations. Tube from ½ to 2¾" in diameter, up to 75' in length, can be made.

Surface conditions are uniform since the kneading action of process densifies the tube surfaces and minimizes possibility of surface flaws.

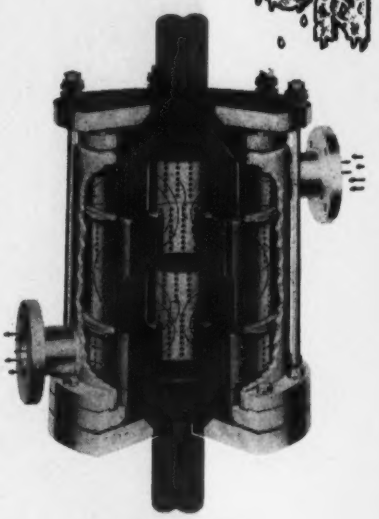
In addition to bi-metal, tri-metal tubes can be produced. Tubes can be designed to meet specific corrosive conditions on exterior as well as interior of tube.

For heat exchanger applications, tube can be produced with straight or spiral fins to increase heat-exchange surface.

(For further information on bi-metal tube contact Damascus Tube Company, P.O. Box 71, Greenville, Pa.)

Check 3135 opposite last page.

BEAT CORROSION



WITH "POLYBLOC" HEAT EXCHANGERS

STACKED IMPERVIOUS GRAPHITE BLOCKS

•

HIGH EFFICIENCY ASSURED BY VERY SHORT PASSAGES AND MIXING CHAMBERS

•

LOW MAINTENANCE GUARANTEED

•

NO FRAGILE TUBES

•

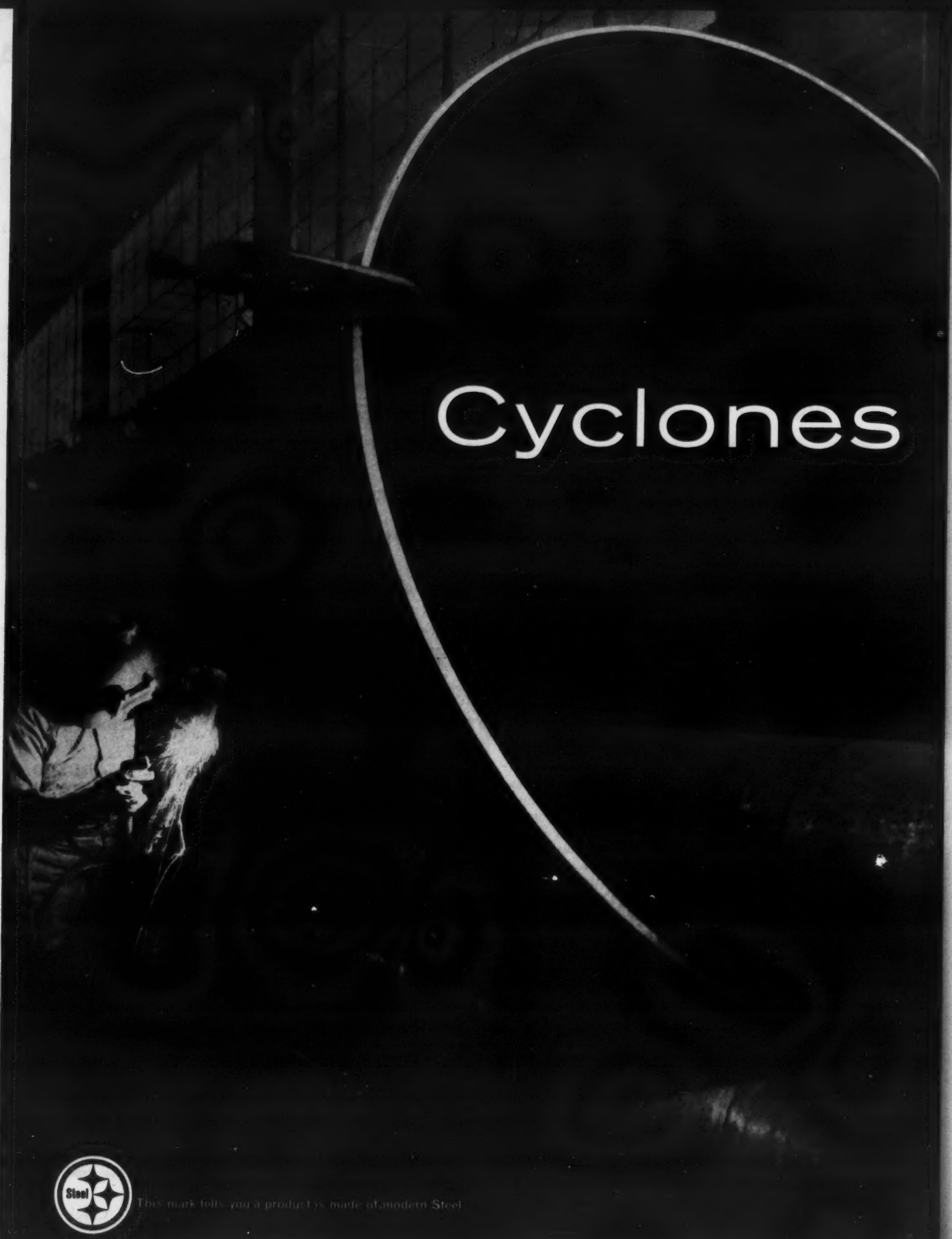
NO CEMENTED JOINTS

•

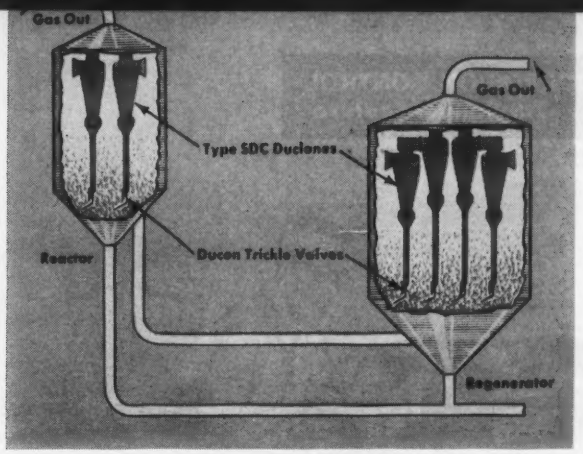
Write for free engineering manual

CARBONE CORP. THE CARBONE CORPORATION
BOONTON, NEW JERSEY

Check 3136 opposite last page.



Steel This mark tells you a product is made of modern Steel



General arrangement of Ducon cyclones in the reactor and regenerator of a fluid catalytic cracking unit. Stainless cyclone collectors keep catalyst loss to a minimum. "Duclone" is a registered trademark of the Ducon Co.

start here...

... and end up in fluid bed cat crackers where they circulate up to 60 tons of catalyst every minute. At $400 to $500 a ton, lost catalyst can put a lot of red ink into a refinery's operating budget. Breakdowns cost from $20,000 to $50,000 a day. That's why it is so important to design with the right material from the start: USS Stainless Steel.

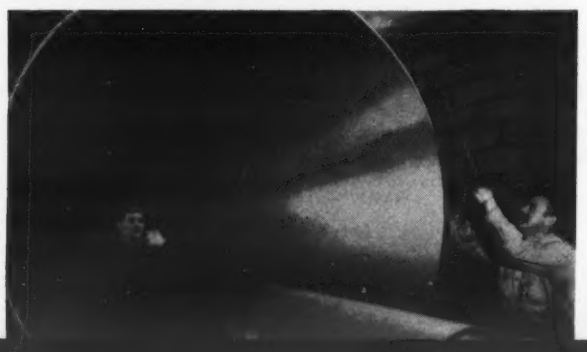
Stainless Steel cyclones used for catalyst recovery are subjected to extreme heat and erosion. Temperatures in a regenerator unit can go as high as 1400° F. At high temperatures elemental sulfur corrosion would eat out most materials in nothing flat. Not Stainless. And Stainless Steel retains its strength at high temperatures. Stainless cyclones aren't in danger of changing shape which could cause catalyst loss.

Nothing equals Stainless Steel as a solution to the many complex problems in a refinery. It has outstanding corrosion resistance for a wide range of reagents, excellent high temperature strength. Its smooth, dense surface won't harbor contamination, is easy to clean. Above all, USS Stainless Steel promises long life and low maintenance. Order USS Stainless Steel through your USS representative or your local Steel Service Center.

If you are interested in more information about these Stainless Steel cyclones, wire or write U.S. Steel, Room 6104, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS is a registered trademark

Left, welder completes longitudinal seam of one segment of the cyclone at The Ducon Company's Mineola, N.Y. plant. **Below,** stainless steel cone is removed from the forming rolls.



USS

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

stop corrosion with...*

Adheron

epoxy finishes

Spray, brush or roll Adheron on wood, steel or masonry surfaces for a tough, flexible, chemical and acid resistant coating.

Hundreds of industrial users are proving the superiority of Adheron epoxy maintenance finishes. You get positive protection against acids, alkalis and corrosive fumes.

Write today for information and prices on the complete Adheron line.

** Proven during more than 5 years of industrial use*

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dynel filter tubes, stainless steel center rod, self-priming SS 316 pump

DEFIES Chemical Attack & Heat!

...up to 250° F

trouble-free DEPTH FILTRATION for problem solutions

Sethco MODEL ASIN-400

FILTER PUMP UNITS

No more difficult hard-to-handle solutions. Hot, highly concentrated acids or alkalies filter fast and clear through these specially designed Sethco Filters. Non-porous, heavy duty construction and automatic reversal for self-washing. Portable, low cost operation.

Over 25 other models—50 to 3000 gals./hr.

Write for Bulletin M1

SETHCO MFG. CORP., 2287 Babylon Turnpike, MERRICK N. Y.

Check 3139 opposite last page.

CHEMICAL PROCESSING CORROSION CONTROL ...7th Annual Feature

RECENT TECHNICAL PAPERS

Discusses low-cost control of cooling tower corrosion

Studies tell how to form, maintain protective film

Corrosion inhibitors in open recirculating cooling water systems require rapid and complete film formation for maximum effectiveness. Studies with polyphosphate-based and chromate-based inhibitors show that the protective film is established on clean metal surfaces by initial treatment with inhibitor at high dosage levels. Protection can then be maintained by continuous treatment at substantially lower levels.

Research work and field tests indicate that the foregoing procedure is both satisfactory and economical. Continuous high-level inhibitor treatment is effective against both corrosion and fouling but is generally economically unfeasible.

Should corrosion protection be partially or entirely lost because of lower than required maintenance level of treatment, low pH conditions or other abnormally corrosive situations, protection may be re-established with high inhibitor dosage for short periods with a minimum degree of deposition.

Experimental work was greatly aided through use of the Corrosometer®, an instrument employing a modified Wheatstone bridge arrangement for measuring corrosion with probes. Loss of protection caused by changing conditions could be observed almost immediately with this procedure.

(Condensed from technical paper, "Cooling Water Inhibitor Performance—Film Formation versus Film Maintenance," by P. R. Puckorius and W. J. Ryzner, Nalco Chemical Company.)

(For further information on use of inhibitors or Corrosometer®—a product of Crest Instrument Co. and distributed by Nalco—contact Nalco Chemical Company, 6216 West 66th Place, Chicago 38, Ill.)

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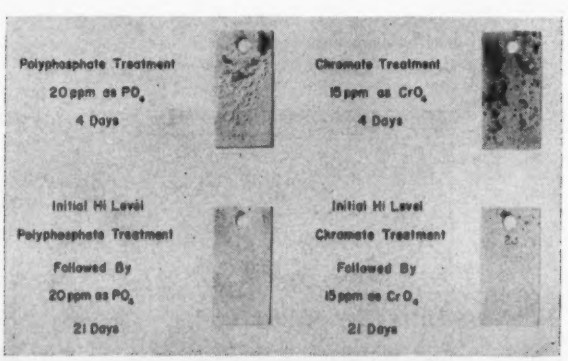


Comparison of inhibition and deposition with high-level and low-level treatments

Bisphenol polyester resin shown highly resistant to corrosive attack

Tested in heavy gel coats and laminates

Recent series of tests was conducted to determine the performance of glass-reinforced polyester resin structures in corrosive aqueous solutions. Tests were run on Atlac 382, a bisphenol-based polyester resin; a general-purpose polyester resin; and a third corrosion-resistant resin of another type.

It is more difficult to test the corrosion resistance of plastics than metals since no one property, such as loss in weight after exposure to corrosives, will tell the story. For this test the plastics were exposed to sulfuric, nitric and hydrochloric acids in various strengths; caustic; distilled water; and bleach at room temperature and 210°F. Specimens were then tested for flexural strength, percent strength retention, modulus of elasticity, percent retention of elasticity — not run after exposure except on screening run.

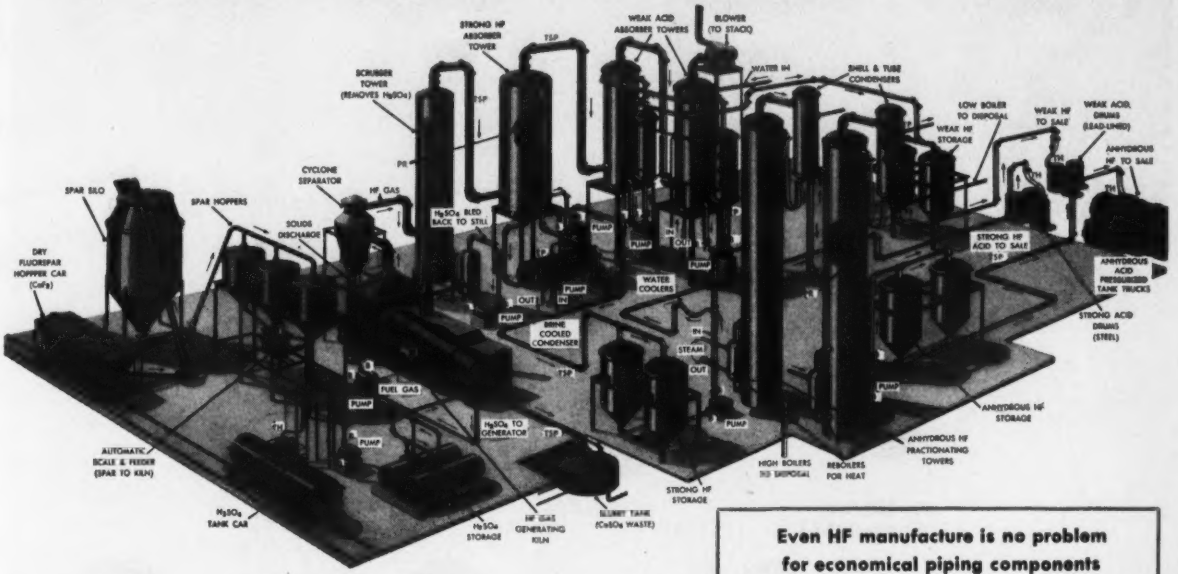
Results indicated that the 382 resin was definitely superior to the other two in nearly all of the corrosives tested. The third resin tested did show a slight edge in sulfuric acid as a casting and in bleach. The 382 resin was the only one that showed up quite well in caustic. Nitric acid produced the most d_astic decrease in strength of any corrosive tested.

Finally, it was shown that even with the best resin, poorly prepared laminates will

NEXT MONTH

The important role that over 2000 ft of rigid polyethylene pipe plays in safeguarding polyvinyl acetate emulsions at Grace Chemical's Owensboro, Kentucky, polymer plant is revealed in CP next month. Be sure to read it!

NOW AT LAST, for all your corrosive piping problems, the overall economy of long-life, corrosion-proof FLUOROFLEX-T (TEFLON)!



Even HF manufacture is no problem for economical piping components of Fluoroflex-T

Check these Fluoroflex-T piping components for economy, installation ease, long life!

TSP FLUOROFLEX-TS—Lined Steel Pipe

Prefabricated to length with flanges —ready to assemble. Minimizes assembly time, shortens checkout time. Complete family of fittings available.

B FLUOROFLEX-T—Bellows-Flex Joints

Molded rather than machined, for unparalleled flex life. Damp out equipment vibration, adjust to longitudinal and temperature movements, add years to life of equipment and piping.

TH FLUOROFLEX-T—Transfer Hose

Completely corrosion-resistant, long flex life. Cover of rubber or of stainless steel braid.

TP FLUOROFLEX-T—Condenser Tube Protectors

Eliminate erosion and corrosion by high-velocity acid on entry side of condenser tubes.

PR FLUOROFLEX-T—Raschig Packing Rings

Economical, durable, corrosion and erosion resistant, with only ¼ the weight of monel rings! Simplify tower design, costs, maintenance.

FLUOROFLEX-T—Dip Pipes, Spargers, Thermowells

Corrosion-resistant nozzle openings, steam nozzles, instrument wells in process equipment.

OVERALL ECONOMY is the key word in Fluoroflex®-T piping installations: ease of installation, decreased maintenance, long equipment life, and elimination of process headaches and downtime.

Now, as was done in the HF diagram above, it is possible for you to pipe your entire corrosive process from start to finish in corrosion-impervious, money-saving Fluoroflex-T! One plant, in fact, equipped with Fluoroflex-T reported savings of $60,000 per month in costs of maintenance, downtime, and product loss!

RECENT PRICE REDUCTIONS in many of the most popular sizes of Fluoroflex-TS lined steel pipe have been made possible by advanced technology, production improvements, and increased sales volume. These substantial price reductions made Fluoroflex-TS lined steel pipe more competitive than ever, on an installed-cost basis, with other corrosion-resistant piping materials!

Fluoroflex-T, the proprietary Teflon® product manufactured and fabricated solely by Resistoflex, is completely resistant to *any* chemical (except high-temperature fluorine and the molten alkali metals) up to 500°F.! Combining optimum flexibility, non-porosity, and strength, it is now available for process use in a complete family of Resistoflex piping components (see panels), in a complete range of sizes and hook-ups to fit any flow, process, or process path.

Resistoflex's trained engineers may have the answer to your equipment problems, to save you money, time, and headaches! Write for Bulletin today!

•Fluoroflex is a Resistoflex trademark, reg. U. S. Pat. Off.
•Teflon is DuPont's trademark for TFE fluorocarbon resins.

RESISTOFLEX CORPORATION

Complete systems for corrosive service
Plants **in Roseland, N. J. • Anaheim, Calif. • Dallas, Tex. •** ***Sales Offices*** **in major cities**

Check 3141 opposite last page.

give unsatisfactory results. Therefore, a good resin in a well-wet-out, well-constructed laminate, which has a resin-rich surface layer, is needed for maximum corrosion resistance.

(Condensed from technical paper, "A Study of The Relative Chemical Resistance of Some Reinforced Plastics," by S. S. Feuer and A. F. Torres of Atlas Powder Company.)

(For further information on Atlac 382 contact Atlas Powder Co., Wilmington 99, Del.)

Check 3143 opposite last page.

Coatings based on epoxy and coal tar pitch gain top interest

Must be carefully evaluated for best performance

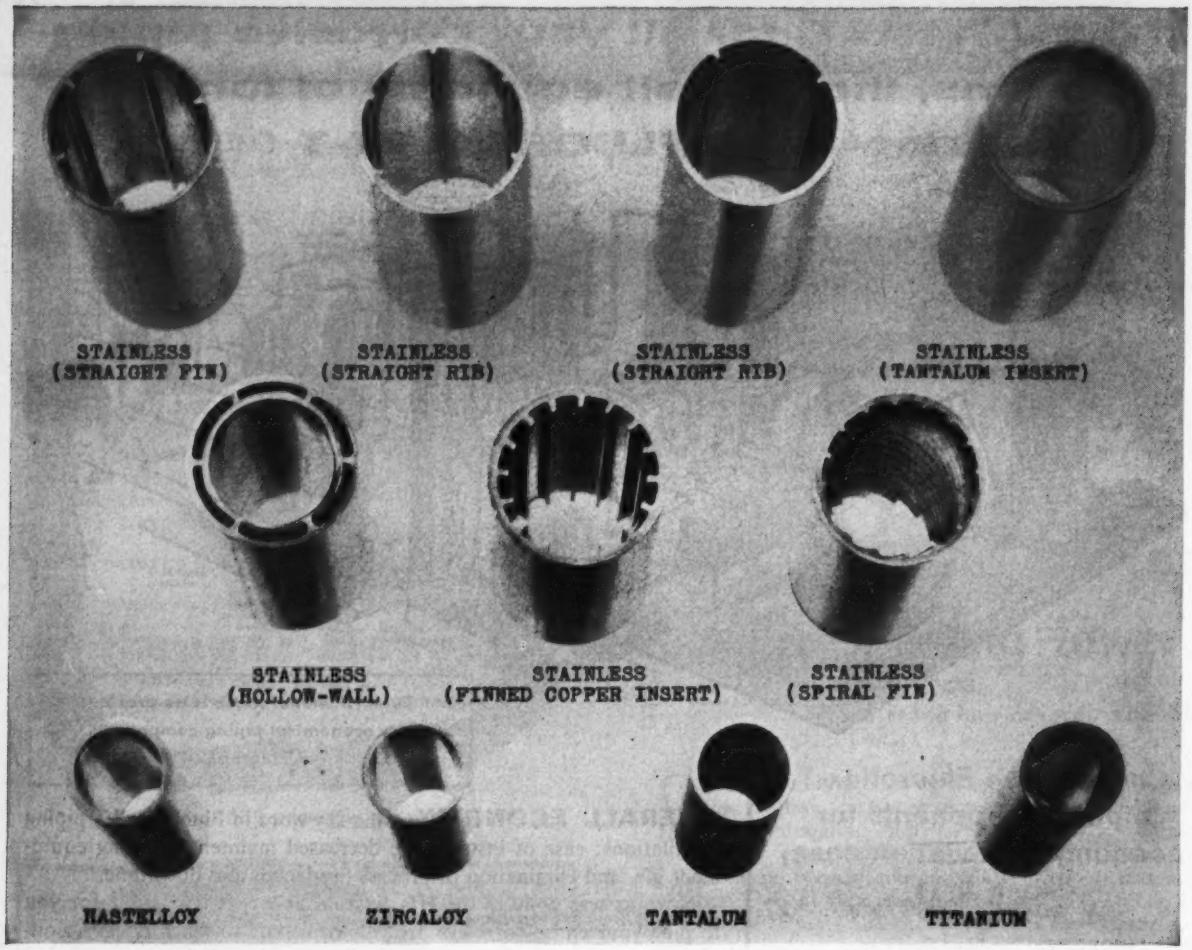
Tremendous interest has been aroused in recent years by coatings based on coal tar pitch and epoxy resin. Such coatings have great value when properly formulated and applied, but they must be checked very carefully if the user is to obtain the good results expected.

Some coatings of this type are well formulated but others are of questionable quality. Test work shows the importance of having the two components in the correct ratio. When properly formulated, coating does not sag, has excellent adhesion and is flexible. With improper formulation, these properties are unsatisfactory.

Coating should be applied to a sand-blasted surface. Thickness should not be below 10 mils and preferably 15 to 20 mils. This is usually applied in two coats.

Coal tar-epoxy coatings have provided outstanding results in chemical service. Resistance is midway between that of straight epoxy coatings and that of cold-applied coal tar coatings.

The tar-epoxy coatings are resistant to most aliphatic chemicals including petroleum and petroleum products, dilute solutions of inorganic acids, sodium hydroxide and



ALL OF THESE TUBES WERE PRODUCED by a remarkable new process called FLO-ROL

Tubes like these have never been economically available before. The entirely new process, known as FLO-ROL, will produce a wide variety of internal configurations, in high cost alloys, stainless steel, and other hard-to-work metals, plus many bi-metal and tri-metal combinations. Wall tolerances for FLO-ROL tubing can be held to ±.0005" and diameters to ±.002" depending on sizes.

- *Internally Finned Tubes* offer increased surface for more rapid heat transfer.
- *Bi-Metal Tubes*—stainless steel tubes with tantalum, zirconium, or other expensive material offer exceptional corrosion-resistant qualities without the prohibitive cost.
- *Hollow Wall Tubes* or barrier tubes are available in several designs for nuclear work or other special applications where a chambered tube is essential or desirable.
- *Thin Wall Tubes* for pneumatic lines are available with .015" wall or lighter.

FLO-ROL precision tubular products can be furnished from ½" to 2½" O.D. and, in some instances, in lengths up to 75'. For complete information contact your nearest Damascus representative or write direct. For prompt service send prints and specifications—we will be happy to work with you.

Send for new FLO-ROL PRECISION TUBE BULLETIN TODAY

DAMASCUS TUBE COMPANY
STAINLESS STEEL TUBING AND PIPE
GREENVILLE, PENNSYLVANIA

Check 3142 opposite last page.

Fairbanks, Morse
presents:

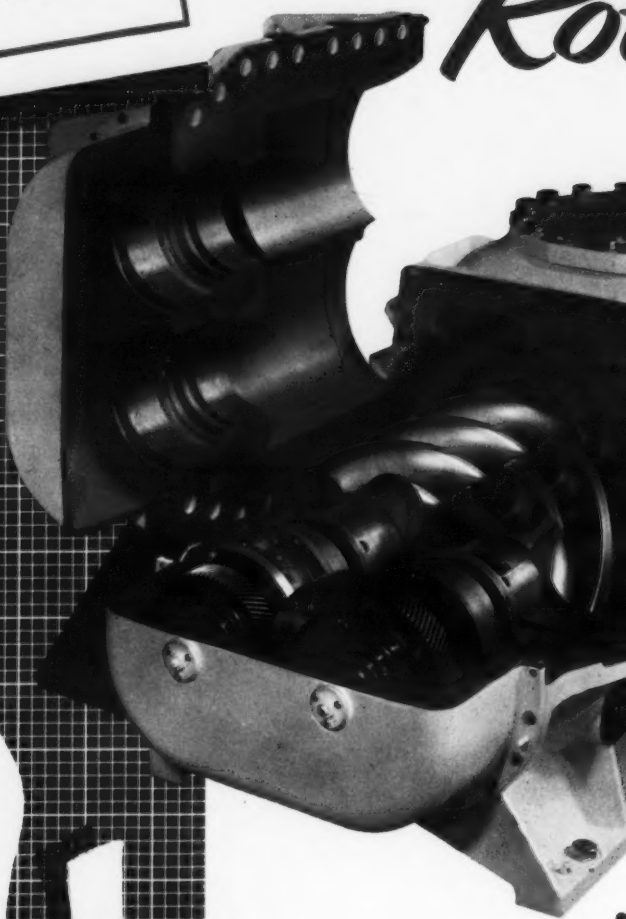
A Proved Way to Prevent "Production Downtime!"

Fairbanks, Morse
presents:

the amazing

F-M HEAVY

Ro



Fewer wearing parts mean Freedom from Shutdowns!

- Rotors revolve without touching each other . . . or housing walls! . . . Vital parts and efficiency are maintained!
- It's S-M-O-O-T-H . . . no loosening of foundations or connections!
- Combines the best of both centrifugal and reciprocating compressors.

Oil Fre
ciency
HP rod

- The press to ac tios u eithe avail sors!
- *Care-* requi tion comp

A Proved Way to Prevent Mechanical Breako

F-M HEAVY-DUTY COMPRESSORS HAVE BEEN TH

ing

AVY DUTY

Rotary Compressor

- Capacity up to 20,000 CFM
- Compression ratios up to 5:1 per stage

Oil Free Delivery! High Efficiency Compression with low HP reduces Operation Costs!

- The F-M Heavy Duty Compressor uses less horsepower to achieve compression ratios up to 5:1 per stage than either a centrifugal or other available rotary compressors!
- *Care-Free* F-M Compressor requires no internal lubrication . . . provides *Oil-Free* compression.

It's Compact . . . uses less floor space!

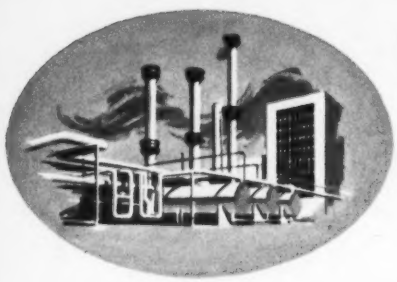
- Other compressors cost *more* because of increased installation and maintenance costs!
- F-M's heavy duty compressor weighs less . . . uses lower cost foundations.
- Less floor space increases your plant operating efficiencies.

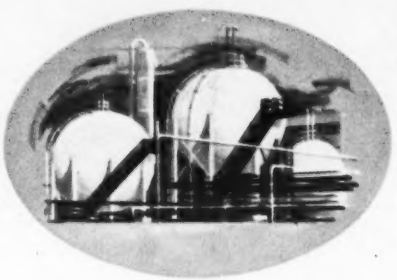
F-M's Compressor is surge-free because of *Positive Action Design!* No pistons, valves, reciprocating parts!

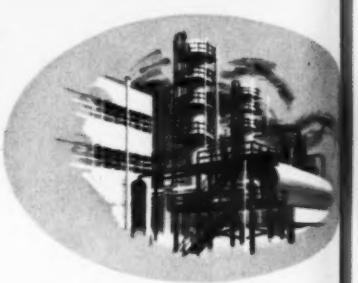
- Helical shaped rotors compress air or gas smoothly with high over-all economy.
- Axial compression occurs with the meshing of the male rotor lobes and the female rotor lobes. Discharge of compressed air or gas from successive interlobal cavities overlap resulting in *steady delivery, minimum vibration.*

akdowns and Shutdowns!

BEEN THOROUGHLY PROVED IN MAJOR INDUSTRIAL INSTALLATIONS . . HERE AND ABROAD **PLEASE TURN PAGE**







Orders filled or at hand for the unique Fairbanks, Morse Rotary Compressor read like a "Who's Who" of world-wide industry. You'll recognize them instantly! We'll make the list available on request.

Only F-M's Rotary Compressor gives you . . .
Continuous trouble free operation. • Less wear. • Fewer replacements. • Smooth, surge-free compression. • Highest efficiency of any rotating compressor. • Minimum floor space requirements. • Oil-free compression. • Minimum foundation costs. • No pistons, valves, reciprocating parts to wear. • No metal-to-metal contact in compression chamber. • No internal lubrication. • Pressure, vacuum or combination operation. • Minimum vibration, fewer repairs. • Less costly to install, operate and maintain. • Maximum mechanical simplicity. • Adaptable as portable or skid type unit. • High compression ratios.

The F-M Compressor . . . a *Versatile Asset* to Any Operation! F-M Rotary Compressors are available as single-stage units ranging in capacities from 800 to 20,000 cfm, for compression ratios from 1.6:1 to 5.0:1. Also for multi-stage or booster service at maximum working pressures up to 250 psig.

The F-M Compressor . . . a *Valuable Asset* to Any Operation! Chemical Processors—manufacturers of ammonia, ammonium nitrate, hydrogen peroxide, chlorine, ethylene, butadiene, acids, phenol, formaldehyde, and other chemical products requiring the compression of air or gas.

General Uses . . . Pressure and vacuum systems, process re frigeration, gas and vapor recycle service, production of yeast, tonnage oxygen, fertilizer. Catalytic cracking operations, fermentation processes, vapor recovery systems, aeration and agitation with air or gas. (This is by no means a complete list of uses . . .)

For More Information . . . send for your copy of our latest technical literature. It includes full details about today's most talked-about compressor . . . the F-M Rotary Compressor.

Tear Out This Advertisement . . . It's perforated for easy removal, office routing or filing. *Let's face it*—much equipment in the chemical, processing and mass-production industries is "here today, scrapped tomorrow"—obsolete long before it wears out. Be prepared for this eventuality. Start thinking about the Fairbanks, Morse Heavy-Duty Rotary Compressor . . . now!

Fairbanks, Morse & Co.

600 South Michigan Avenue, Chicago 5, Illinois

A MAJOR INDUSTRIAL COMPONENT OF
FAIRBANKS WHITNEY CORPORATION, NEW YORK

ACOB 100.3

Printed in U. S. A.

dilute solutions of most inorganic salts.

(Condensed from technical paper, "Characteristics of Coal Tar Pitch-Epoxy Resin Coatings," which was prepared by F. C. Whittier, research manager, Coatings and N. T. Shideler, coatings advisor, Pittsburgh Coke and Chemical Company. Paper was presented at the 1960 annual meeting of the National Association of Corrosion Engineers in Dallas.)

(Further information on evaluation of coal tar-epoxy resin coatings can be obtained from Pittsburgh Chemical Co., div. of Pittsburgh Coke and Chemical Co., Grant Bldg., Pittsburgh 19, Pa.)

Check 3171 opposite last page.

Company installs 10,000' of rigid vinyl pipe underground

Natural gas distribution services containing some 10,000' of rigid vinyl pipe were recently installed in Decatur, Illinois by the Illinois Power Company. System uses ¾" vinyl pipe. It is a medium-wall pipe which provides greater impact strength than thin-walled pipe at slight additional cost.

Made from vinyl resin, pipe has high tensile strength. It is unaffected by corrosives and is smooth inside and out. It is not subject to attacks by salt water, chemicals, acid or alkaline soils, or galvanic corrosion.

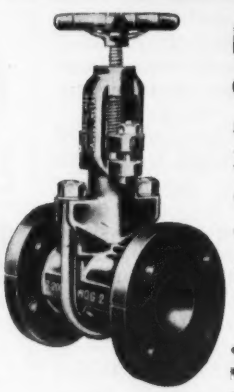
(Geon vinyl resin used in pipe is product of B. F. Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, Ohio.)

Check 3172 opposite last page.

(Vinyl pipe was produced by Kraloy Plastic Pipe Company, Inc., 4710-20 East Washington Blvd., Los Angeles 22, Calif.)

Check 3173 opposite last page.

For more information on product at left, specify 3174 . . . see information request blank opposite last page.



How to break the "High-Priced Valve" Habit in corrosive services . . . Corrosive service once called for premium-priced valves—made entirely of stainless steel or Monel Metal. Then Lunkenheimer developed exclusive "Causul" Metal to provide "high-alloy" performance at *lower cost . . . balanced corrosion resistance* for many caustic, acid and alkaline solutions. The result has been a substantial reduction in valve costs in countless applications that formerly required premium-priced alloys. Ask your Lunkenheimer Distributor to review the corrosive problems in *your* plant. Or write the Lunkenheimer Company, Cincinnati 14, Ohio. **You can't find the cost of a valve on a price list.**

• BRONZE
• IRON
• STEEL
• PVC

L-260-13

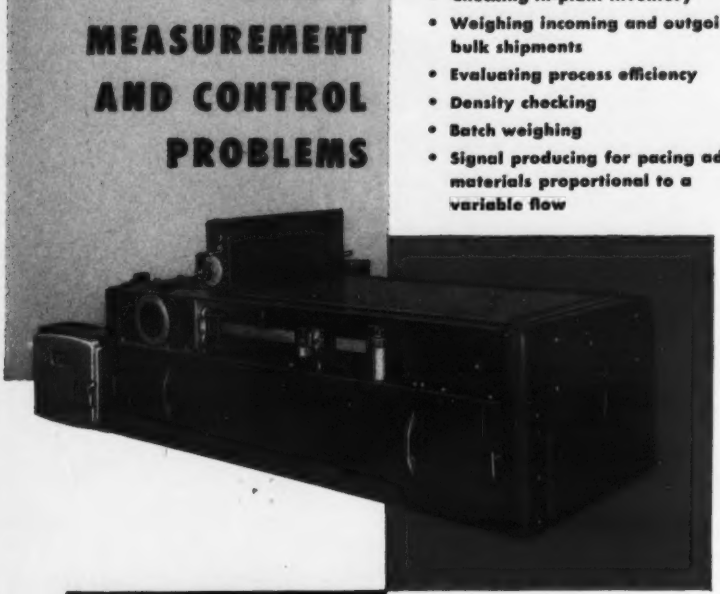
LUNKENHEIMER®
THE ONE *Great* NAME IN VALVES

Check 3175 opposite last page.

POSITIVE CONTROL OF MATERIALS IN MOTION B-I-F METERS FEEDERS CONTROLS

B-I-F BELT WEIGHER SOLVES PROCESS MEASUREMENT AND CONTROL PROBLEMS

- Checking production line output
- Checking in-plant inventory
- Weighing incoming and outgoing bulk shipments
- Evaluating process efficiency
- Density checking
- Batch weighing
- Signal producing for pacing additive materials proportional to a variable flow



CASE STUDY No. 1

Omega **Pneu-Weigh Belt Weigher** checked production line output of 50 volumetric feeders to maintain critical limits . . . reduced plant downtime, lost man hours and production holdups!

Each feeder on proportioning line of a major formulator was putting out particular fraction of formula on continuous basis. Pneu-Weigh, installed at end of collector conveyor to "watchdog" operation through remotely located instrument, indicated less-than-expected output. A check revealed delivery rate of one volumetric feeder crtically lower than its limit. Result: over 100 tons of formulated product saved from being remade at considerable expense in plant time, man-hours, planning, removal of paper-bag packages, and subsequent resacking.

You'll find opportunities for cutting costs and improving efficiency in process feeding when you consult B-I-F — manufacturer of the most complete line of solid and liquid feeders and weighers.

B-I-F **Industries**

BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA

METERS • FEEDERS • CONTROLS / CONTINUOUS PROCESS ENGINEERING

Pneu-Weigh offers extremely high accuracies, wide ranges, capacities in compact, uncomplicated unit. Request Bulletin 36.20-1 for details. Write **B-I-F Industries, Inc., 387 Harris Avenue, Providence 1, R. I.**

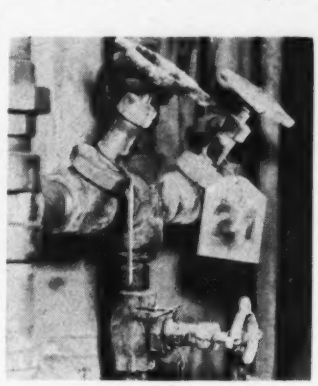
Check 3176 opposite last page.

CORROSION CONTROL

Bronze globe valves cut maintenance, halt shutdowns

No trouble handling 150-psi steam for two years

Problem: Valves on steam lines were a high maintenance item in the plant of the Marshall-Eclipse Division of Bendix Aviation Corporation located in Green Island (Troy), N.Y. Common sources of failure were scoring of seats, trim and body erosion, and general failure to shut off when necessary. The plant



Bronze glove valves on steam lines in boiler room

manufactures synthetic resins, adhesives and asbestos brake linings.

Demand for steam is high throughout the plant and the troublesome valves were installed in 150-psi steam lines in the main boiler room. When equipment was shut down to replace a valve, loss of production was far more costly than price of valve and labor to install it. A valve that would keep various operations going continuously was needed.

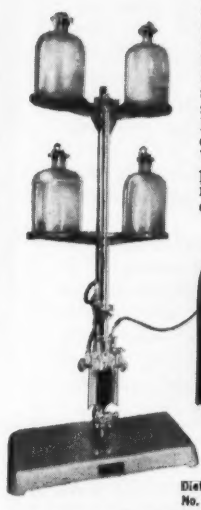
Solution: After a number of unsuccessful plant trials with various valves, engineers specified LQ600 bronze globe valves with seats and discs of a wear-resistant alloy, Brinalloy. This alloy has more resistance to wear and wire drawing than 500 Brinell stainless steel.

Contact surfaces are lapped to a mirror-smooth finish. Seat and disc are silver-brazed into body and disc holder. Despite flat seating,

Fast Accurate Sulfur ANALYSIS

PETROLEUM PRODUCTS
iron steel
ORGANIC CHEMICALS
WOOD COAL
stainless alloys
COKE MINERALS
non-ferrous metals

with a DIETERT-DETROIT Sulfur Determinator



Extremely simple direct-reading burette. No involved measuring or computing. Provides fast accurate analysis of sulfur content in scores of materials. Low cost, durable, easily maintained. Widely used in company laboratories and institutions of every description.

Dietert-Detroit Sulfur Determinator No. 3104, with combustion Furnace.

SEND FOR FREE CATALOG!

16 page Dietert-Detroit Catalog illustrates and describes both Sulfur and Carbon Determinators and complete line of accessory equipment and supplies.

HARRY W. DIETERT CO.
CONTROL EQUIPMENT
9330 ROSELAWN DETROIT 4, MICHIGAN

Send me your Carbon-Sulfur Determinator catalog.

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Check 3177 opposite last page.

valve does not trap solids in closing. Foreign material that lodges momentarily is crushed beneath seating surfaces. Line fluid sweeps through until metal meets metal to effect a tight closure.

Results: Bronze globe valves have been installed in the steam lines for over two years and during that time have not caused any trouble and have not required any maintenance.

(LQ600 valves are product of The Lunkenheimer Company, Cincinnati 14, Ohio.)

Check 3178 opposite last page.

Sulfuric acid splashes can't hurt tank truck coated with Hypalon

Problems: Maintenance coating used on tank trucks transporting sulfuric acid for a Canadian company lasted only one trip. They would then peel off of entire back end of trailer, which was subject to sulfuric acid splashes during loading and unloading.

Sulfuric acid is transported from pickling mine to a disposal dump. Acid concentration varies from 8 to 12% and

Hypalon coating on tank truck has resisted sulfuric acid for two years

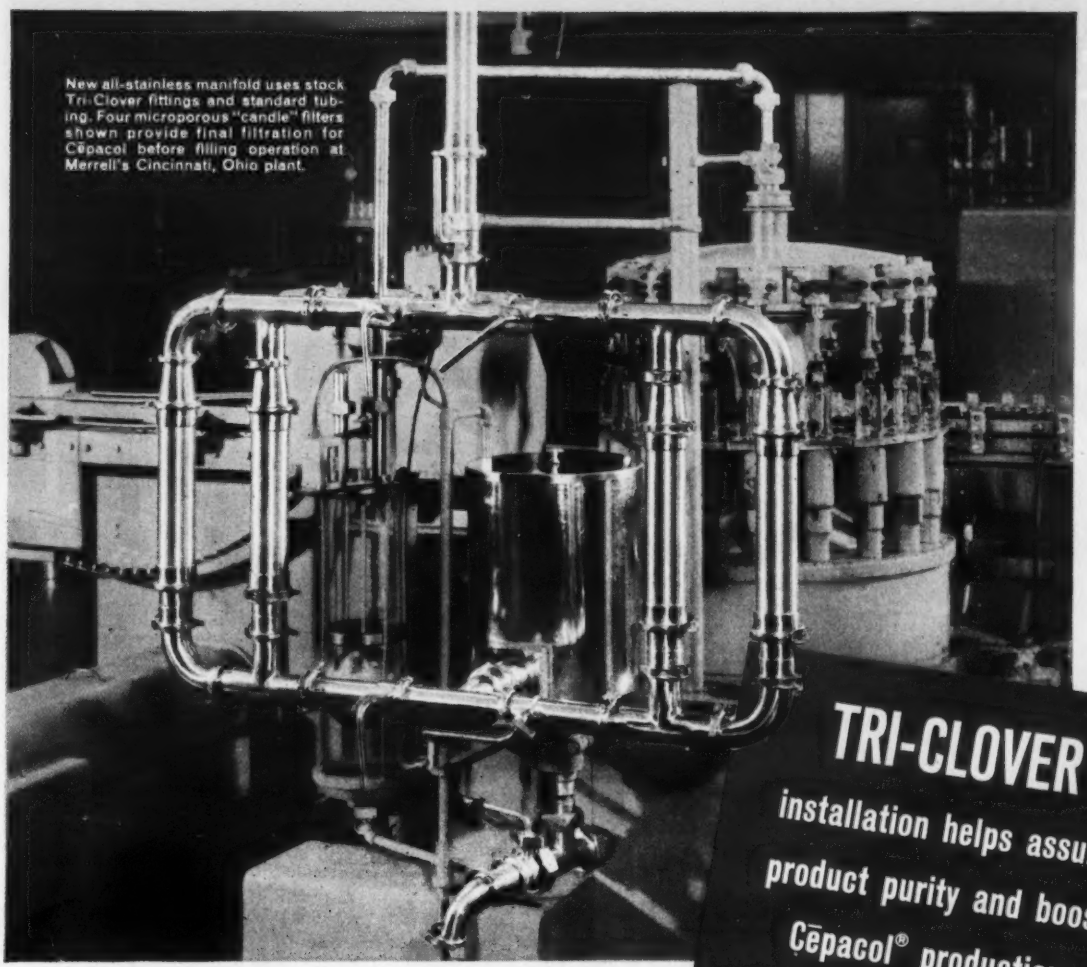
is loaded into tank trucks at about 200°F. Tank trucks involved operate around the clock.

Solution: One of trucks was coated with a Hypalon coating to provide protection from splashing of the acid.

Results: This Hypalon-coated tank truck has now been in service two years without any sign of deterioration of the coating.

(GACO H-2 Hypalon coating is product of Gates Engineering Company, 100 South West St., Wilmington 99, Del.)

Check 3179 opposite last page.


New all-stainless manifold uses stock Tri-Clover fittings and standard tubing. Four microporous "candle" filters shown provide final filtration for Cēpacol before filling operation at Merrell's Cincinnati, Ohio plant.

TRI-CLOVER installation helps assure product purity and boost Cēpacol® production for The Wm. S. Merrell Co.

How manifold redesign made an already efficient process even more functional . . .

A continuous flow process for manufacturing Cēpacol has assured The Wm. S. Merrell Company increased protection for the product purity of their antibacterial mouthwash gargle and turned in processing savings as well.

The new process resulted in an uninterrupted flow of material to packaging lines, and released manpower for other important production operations. It incorporates a unique "candle" filter manifold to promote thorough blending and to secure the highest possible purity of the product just prior to packaging. The original manifold had to be specially fabricated and was costly to operate.

Then, Merrell Company engineers and Tri-Clover Division specialists redesigned it, as shown above, to include all *stock;* Tri-Clover Stainless Steel Fittings, Valves and Tubing. The result: An already efficient process made *more* functional. The new stainless steel manifold is easier to clean, pleasing in appearance. It also cost them less to fabricate and less to operate than the original manifold.

This is another good example of how Tri-Clover's exclusive design features, in the hands of experienced Tri-Clover engineers, can help you to translate process efficiency . . . into process *savings.*

I-180

See your nearest Tri-Clover Distributor.

TRI-CLOVER **LADISH CO.** *Tri-Clover Division* Kenosha Wisconsin

IN CANADA: Brantford, Ontario
EXPORT DEPARTMENT: 8 South Michigan Avenue, Chicago 3, Illinois
Cable TRICLO, CHICAGO

Check 3180 opposite last page.

OFF AGAIN ON AGAIN SAVE AGAIN

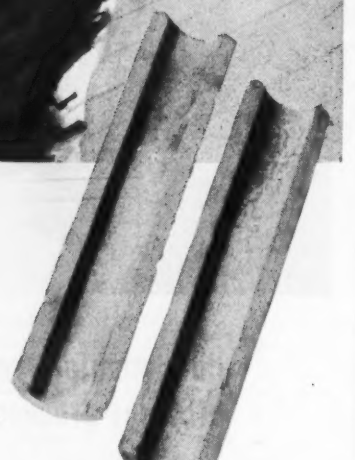
with Unibestos reusable pipe insulation

Why is Unibestos worth more at competitive prices than other insulations? One California refinery required removal and replacement of Unibestos insulation from a 24-inch line TWICE A MONTH FOR FIVE YEARS! Naturally, these people now use Unibestos exclusively.

Everywhere . . . in refineries, power plants, process industries . . . once Unibestos is put to work, we have a steady customer. All we ask is a chance to show *you* how Unibestos can be constantly and effectively reused; how it resists impact and rough handling; eliminates shrinkage; defies thermal shock, fumes, acids and moisture; cuts application time and costs; and guarantees real insulating efficiency. Only Unibestos is made from the exceptionally long fibers of tough ***Amosite*** asbestos.

Available in full range of standard pipe sizes and in block form. Single thickness to five inches. Specials to 44″ O.D.

Write today, on your letterhead, for Bulletin No. 65610.



UNIBESTOS AFTER 25 REUSES

Unretouched photograph of typical sections of Unibestos pipe insulation after 25 reuses. Rugged qualities of Unibestos make reuse on changed lines or test lines standard operating procedure under all types of conditions.

UNIBESTOS

worth more, yet sold at competitive prices

UNARCO ®

UNARCO PRODUCTS

• UNIBESTOS, Amosite Asbestos Pipe Covering and Block • Calcium Silicate Pipe Covering and Block • 85% Magnesia Pipe Covering and Block • Mineral Fiber Block • Wrap-On Insulation • Lace-On Insulation • Turbine Blankets • Insulating and Finishing Cements • Asbestos Textiles • Packing and Gasketing.

UNION ASBESTOS AND RUBBER COMPANY • FIBROUS PRODUCTS DIVISION

DEPT. 204, Bloomington, Illinois

Check 3181 opposite last page.

Epoxy-phenolic coating protects high-speed petrochemical tow

A large high-speed integrated tow designed to carry chemicals exclusively was recently placed in service by Jefferson Chemical Company of Houston, Texas. To protect the steel from corrosive attack by the various chemicals carried, all cargo bins were lined with an epoxy-phenolic protective coating.

Tow consists of three barges with a total length of 700′ and a capacity of 5000 tons per trip. The barges carry caustic soda, glycols, ethanolamines and a variety of other products from Jefferson's Port Neches, Texas, plant to Midwest terminals on the Mississippi-Ohio River system.

This rugged and varied service made it necessary to apply a protective coating which would resist various chemicals carried. Coating also needed high resistance to abrasion and impact, low rate of water absorption and transmission, and resistance to water and water vapor. Chemical reaction of the coating had to be avoided to eliminate possibility of contaminating the high-purity chemicals. Also, the coating had to be able to stand repeated scrubbing between cargoes.

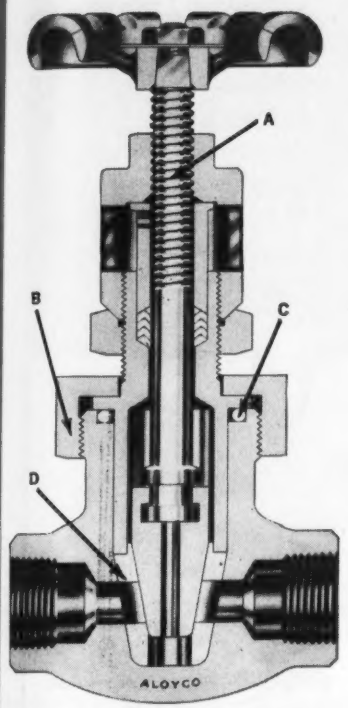
All of these requirements were satisfied by the No. 75 epoxy-phenolic coating. This coating will withstand continuous immersion in 73% caustic at temperatures up to 290°F, as well as such products as alcohols, aromatic petroleum solvents, fuel oils, vegetable and animal oils, ketones and most glycols, including ethylene and propylene.

A final baking temperature as low as 150°F is all that is required to cure the recommended 8 to 10 mil film. If repair of the lining or recoating is required, No. 75 may be completely removed or patched by sandblasting and application of coats.

(No. 75 Epoxy Phenolic Coating is product of Amercoat Corp., 4809 Firestone Blvd., So. Gate, Calif.)

Check 3182 opposite last page.

Aloyco Plug Gate Valve #66 succeeds with severe corrosives for 10 straight years!



Shown ⅔ actual size of the half-inch valve

WHY? **A. OUTSIDE STEM THREADS** are away from corrosive area, prevent galling.
B. UNION BONNET provides extra strength and easy disassembly.
C. O-RING made of "Teflon"* provides tough, leak-proof seal.
D. SEATS made of "Teflon"* are pressure-tight, dependable, won't gall. Renewable.
STAINLESS STEEL: 18-8S, 18-8SMo, Aloyco 20.

FOR: Instrument lines, small lines handling viscous fluids, or where low pressure drop is important.
FACTS: full-floating plug disc exerts no twisting action on the removable seat in closing. Aloyco Stainless Steel #66 Plug Gate Valve: 1200 lb. at 150 F.; 600 lb. at 500 F. Sizes: ⅛", ¼", ⅜", ½". Want more? Write: Alloy Steel Products Company, 1302 West Elizabeth Ave., Linden, New Jersey. O.5

*Registered DuPont Trademark

Longer Lasting ALOYCO VALVES
TRY 'EM IN CORROSIVE SERVICE

ALLOY STEEL PRODUCTS COMPANY
Check 3183 opposite last page.

CUT HERE AND FILE

CORROSION KEYS

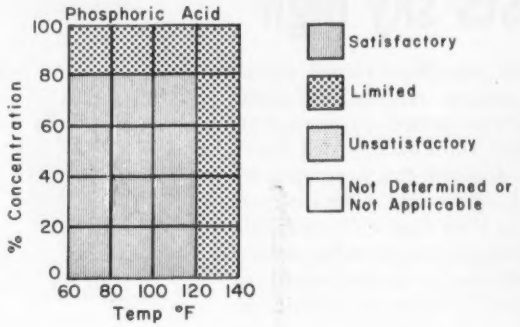
Polyethylene

ALFRED STOCKFLETH, Program Specialist
Polychemicals Department
E. I. du Pont de Nemours & Company

"Corrosion Keys" are copyrighted (1960) *by Putman Publishing Company*

Corrosion Keys showing resistance of polyethylene to various chemicals follow. Data are applicable to both high-density and low-density polyethylene.

Note open spaces in the keys for hydrochloric acid, chromic acid, formaldehyde, sodium hydroxide, bleach solutions and hydrofluoric acid. These blanks do not necessarily signify that polyethylene performs unsatisfactorily in the range indicated or that the reaction is unknown. Rather, it is an indication that the approximate limit of solubility for each of the substances has been reached.



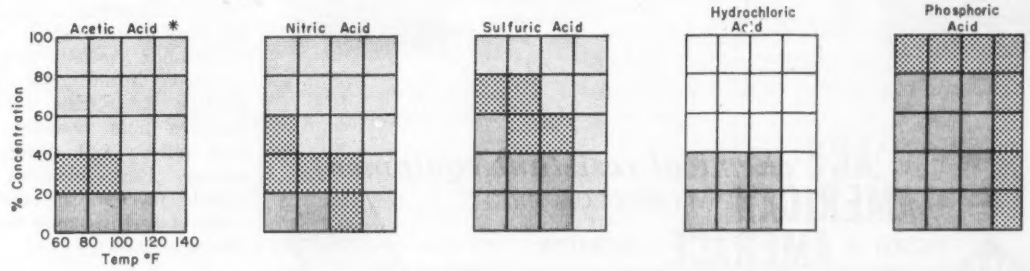
The blank spaces in the corrosion chart on animal and vegetable oils are open for various interpretations. Reaction depends on the specific substance or oil, although probably most would react unsatisfactorily at elevated temperatures.

In deciding whether or not polyethylene in the form of tubing, pipe, sheet, gaskets, or complex moldings is suitable for use in chemical or corrosive service, it is often necessary to rely upon test results which are only rough indications of what might be expected in actual service.

Most of the data available are based on laboratory tests of specimens which have been immersed in test solutions for relatively short periods of time, noting changes in appearance, gain or loss of weight, and changes in strength. In service, pipe, tubing, gaskets, vessels, etc., are usually subjected to mechanical loading, which may markedly alter the results obtained from simple immersion tests.

Since very little service test data are available, the following Corrosion Keys are largely derived from immersion tests and should be used only as a guide to further service testing rather than as information directly applicable

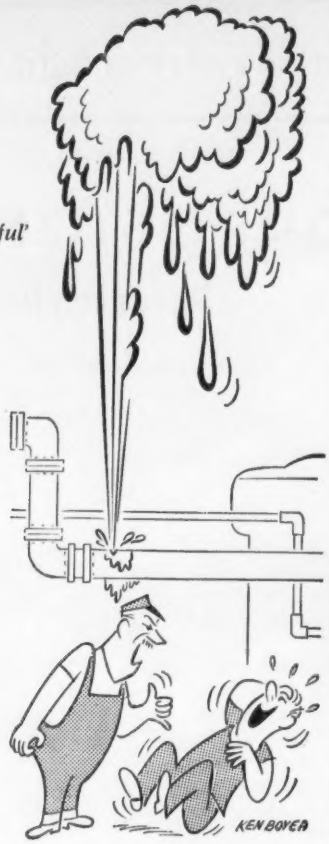
To page 81



* Polyethylene is permeable to acetic acid.

Life in these excited states...

"Stop saying 'There goes Old Faithful' and get it fixed!"



What to do when corrosion sends costs sky high

No one can afford ruined equipment, endless repairs, and plant shut-downs caused by corrosion. And you *shouldn't* afford *over*-design and too-fancy equipment. Ace takes you right down the middle . . . a wide choice of chemical-resistant pipe, pumps, valves, tanks, etc. Best for the money anywhere . . . backed by 108 years' experience.

Best non-metallic pipe anywhere for *hot* chemicals to 275°F. Also handles tough organics. Rigid, tough nitrile. Pipe and fittings to 8". *Bul. 96A.*

1001 uses. Non-toxic, odorless, tasteless, sterilizable, flexible tubing. Excellent for chemicals, foods, and for lab or machine lines. ⅛ to 1¼". *Bul. 66.*

Heavy Ace rubber and plastic tank linings unexcelled for alkalies, acids, bleaches, salts. Faultless seams, indestructible bond, shock and age-resistant. All shapes. *Bul. CE-53.*

Special equipment often can be machined, punched or welded of standard plastic or hard rubber sheet, rod or tubing. Write for details today.

ACE *chemical resistant equipment*
BY **AMERICAN** HARD RUBBER COMPANY
DIVISION OF **AMERACE** CORPORATION
ACE ROAD • BUTLER, N.J.

See ACE equipment in Chemical Engineering Catalog

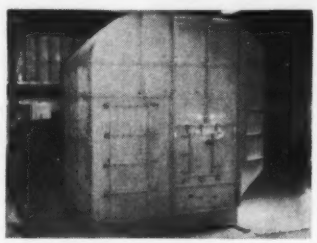
Check 3184 opposite last page.

CORROSION CONTROL

Jumbo plastic scrubber resists sulfuric

One of the largest solid plastic structures ever built for handling and scrubbing chemical corrosive fumes was recently placed in service. Washer is 12′ high and has a 7′ diameter outlet. Unit was constructed of polyester reinforced with glass fiber.

Fumes handled by equipment are contaminted principally with sulfuric acid. Light weight of unit permitted placement on roof without exceeding roof loading limit.



Plastic fume scrubber is lightweight

(Fume washer is manufactured by Heil Process Equipment Corp., 1209 Elmwood Ave., Cleveland 11, Ohio.)

Check 3185 opposite last page.

Mercury-inhibited brass for heat exchangers resists biofouling

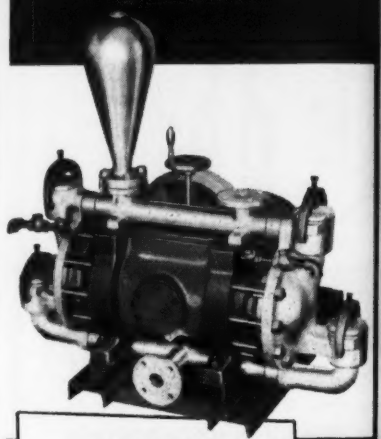
Copper-base condenser tube alloy, called Alloy 77, incorporates mercury as a corrosion inhibitor. Addition of a small amount of mercury to this copper-zinc alloy produces a condenser-tube material possessing unusual resistance to biofouling. It also withstands other forms of corrosive attack and dezincification. Low-scale formation reduces heat transfer losses and allows full design efficiency. Easy cleaning with simple mechanical equipment reduces maintenance expenditures.

(Alloy 77 condenser tube is product of Bridgeport Brass Company, Bridgeport 2, Conn.)

Check 3186 opposite last page.

for those
hard-to-handle fluids

- CORROSIVE
- ABRASIVE
- VISCOUS
- THICK
- HEAVY
- QUICK SETTLING
- VALUABLE
- SENSITIVE
- HAZARDOUS



SHRIVER DIAPHRAGM PUMP

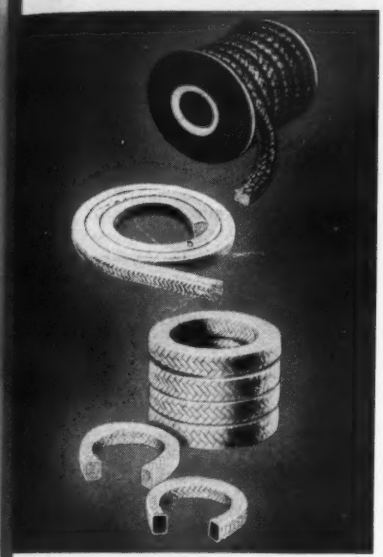
- LOW OPERATING COST
- LOW MAINTENANCE COST
- LONGER SERVICE LIFE
- EASY TO CLEAN

Thousands of Shriver pumps handling materials that clog or wear out other pumps all too quickly have proved their amazing service economy record. It will pay you to get Bulletin 148.

T. SHRIVER & CO., Inc.
846 Hamilton St., Harrison, N. J.

Check 3187 opposite last page.

CHEMPRO SQUARE-BRAIDED TEFLON* PACKINGS



Chempro Square-Braided Teflon Packings are tough, strong and chemically inert. They outlast ordinary braided packing many times over, holding together longer against even the strongest acid, alkali or organic solvent. Here are four popular Chempro Square-Braided Teflon packings:

STYLE No. 400 PACKING
Constructed of pure Chempro tape, braided square without lubrication. For highly corrosive services where a lubricant is undesirable.

STYLE No. 400-F PACKING
Resilient, square-braided packing of Chempro Teflon multi-filament yarn, without lubrication. For pump and valve applications in highly corrosive services where the packing must "give" to a certain extent.

STYLE No. 400-FI PACKING
Square-braided packing of Chempro Teflon multi-filament yarn and impregnated with Teflon suspensoid. This dense packing was developed for gas and vapor services where other lubricated packings were not acceptable.

STYLE No. 400-FL PACKING
Made by square braiding Chempro Teflon multi-filament yarn and externally lubricating with a non-hardening and non-melting lubricant. Recommended for high speed applications and highly corrosive services, from freezing to 350° F.

These Chempro Braided Teflon packings are available in all sizes in standard 1/16" increments from 1/8" to 3/4" square—in spool or coil forms. Can be cut to specific ring sizes, if desired.

Write for revised Bulletin CP-552.

*duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

9 Broadway, New York 4, N. Y.

Check 3188 opposite last page.

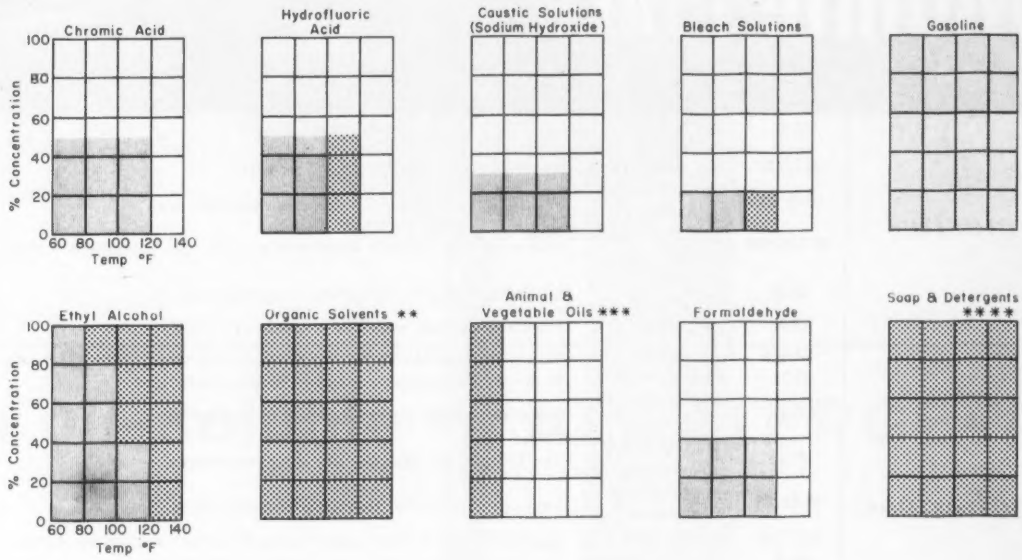
CUT HERE AND FILE

processing and engineering data

Satisfactory
Limited
Unsatisfactory
Not Determined or Not Applicable

CORROSION KEYS: Polyethylene

From page 79



to design or specification work.

Although polyethylene is generally chemically inert, it is subject to some types of chemical attack which may be classified briefly as swelling, solution, direct chemical attack, permeation, and environmental stress cracking.

Swelling and solution: Hydrocarbons such as gasoline and chlorinated hydrocarbons such as carbon tetrachloride cause polyethylene to swell or, at elevated temperatures, to dissolve partially or completely. (Polymers of high molecular weight dissolve more slowly and to a lesser extent than low molecular weight materials.)

Chemical attack: Some chemicals such as nitric acid attack polyethylene rapidly with a resulting increase in weight and loss of strength. Other strong oxidizing agents such as concentrated hydrogen peroxide have but a modest effect.

Permeability: Some materials such as acetic acid or even water appear to have little effect on polyethylene but do permeate or diffuse through it slowly, allowing corrosion to occur under the lining of steel vessels. Permeation is less with high-density resins than with lower density materials.

Environmental stress cracking: Relatively dilute solutions of many soaps and detergents can cause rapid failure of polyethylene under biaxial stress (frequently encountered in pipe or unsupported vessels). High molecular weight resins are more resistant to environmental stress cracking than low molecular weight materials.

(Further information on polyethylene can be obtained from E. I. du Pont de Nemours & Co., Inc., Polychemicals Dept., Wilmington 98, Delaware.)

Check 3189 opposite last page.

Additional Corrosion Keys on other types of plastic and synthetic rubber will appear in later issues.

** Difficult to generalize. Resistance to hydrocarbon and chlorinated solvents generally poor. Each solvent should be tested under service conditions. Some improvement can be effected by using resins of increased molecular weight.

*** Difficult to generalize. Some attack or permeation may occur.

**** Difficult to generalize. In pipe and other similar applications, biaxial stress may cause early failure. Improvement can be effected by using resins of increased molecular weight. Each application should be evaluated carefully.

foster and Maintenance

PROTECT thermal insulation with

				Bulletin Numbers
mastics	60-24	CORK-FILLED MASTIC	Insulating mastic for storage tanks	M-3-B
	60-25/26	C.I. MASTICS	Asphalt vapor-barrier weathercoats	M-1-A, B
	60-30/60	FIRE-RESISTIVE MASTICS	UL-listed non-asphaltic flexible weathercoats	M-3-A
	*60-30N/60N	FIRE-RESISTIVE MASTICS	Non-asphaltic flexible weathercoat with non-flammable solvent	M-1-A, B
	60-80	SAFTEE MASTIC	UL-listed asphalt "breather" weathercoat	M-3-A
	90-07	H.I. MASTIC	Fibrated asphalt emulsion "breather" coating	M-2-B
adhesives	*81-42W	LAGFAS	Economical adhesive for lap-sealing and sizing canvas	A-1-B
	81-13	ADHESIVE A-90	Brush grade adhesive for low density insulations	A-1-A, C
	*81-33	FIRE-RESISTIVE ADHESIVE	Hard-setting for rigid high density insulations	A-1-A, C
	81-60	FIRE-RESISTIVE ADHESIVE	For blanket or high density duct insulations	A-1-A, C
	81-63/66	INSULATION ADHESIVES	Low-cost brush and trowel grade adhesives	A-1-A, C
	81-71/81	DUCT-FAS	Quick-tack with long open time adhesives for duct insulations	A-1-A, C
	81-91	DUCT-FAS WHITE	For lap-sealing white vapor-barrier jackets on pipe covering	A-1-A, C
	*81-99	SAFETEE DUCT-FAS	Non-flammable fire-resistive duct-insulation adhesive	A-1-A, C
	82-18	DUCT-FAS QUICK-TACK	Fast-setting clear rubber cement for insulation facings and jackets	A-1-A, C
flashings	30-14	ASPHALT SEAM SEALER	Chemical and water-resistant flashing compound	F-3-A, C, E
	60-25	C.I. MASTIC	Asphalt sealer for vapor-barrier on pipe jackets	F-2-A
	*60-30N	FIRE-RESISTIVE MASTIC	Non-asphaltic, non-flammable, non-bleeding, elastic	F-1-A
coatings		*LAGTONE	Fire-resistive flexible coatings in white and colors	C-2-A, B
	*30-36	SEALFAS	Light colored fire-resistive abrasion-resistant coating	C-1-A
	30-42	VINYL VAPOR-BARRIER	White vapor-barrier finish coat	C-1-A
		*VITECT VINYL	Chemical-resistant coatings in colors	C-3-A, B, C
		VITECT EPOXY	Tough chemical and solvent-resistant colored coatings	C-3-A, B, C

*THESE PRODUCTS (60/30N, 60/60N, 81/33, 81/42W, 81/99, 30/36, LAGTONE, VITECT VINYL) MEET THE FLAME SPREAD REQUIREMENTS OF GENERAL SERVICES ADMINISTRATION WHEN TESTED IN ACCORDANCE WITH INT. FED. STD. NO. 00136 (COM-N.B.S.) 60/30, 60/60, 60/80 ARE ALSO LISTED BY UNDERWRITERS' LABORATORIES.

The Bulletins listed above are designed to help you solve specific insulation-protection problems. For copies, simply note the numbers on this coupon and mail.

foster COATINGS · SEALERS · ADHESIVES

BENJAMIN foster CO. Division of Amchem Products, Inc. 4635 W. GIRARD AVE. • PHILA. 31, PA

Benjamin foster Co. Sold by America's Leading Insulation Distributors and Contractors.

Please send me the Bulletins for Maintenance which I have noted. I understand there is no obligation.

Name_____

Company_____ Title_____

Street Address_____

City_____ Zone_____ State_____

M-2 Bulletin ____ ____ ____ ____ ____ ____ ____

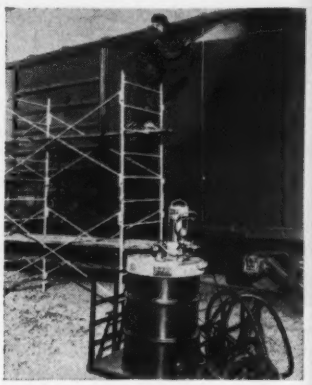
Check 3190 opposite last page.

Airless spray system reduces overspray

Uses: For applying protective coatings.

Features: Overspraying in airless system is drastically reduced in comparison with air-powered systems.

Description: Two basic systems are offered, a 55-gal and a 5-10 gal. With either system, coating is taken from original container through the high-pressure pump. This pump delivers working pressures to 3000 psi and supplies enough material for two spray guns.



Airless spray system permits coatings to be applied with ease

Airless system comes equipped with nylon hose, or may be ordered with stainless steel hose. Spray guns are especially designed for use with airless systems. Each system comes with pump, agitator, elevator, fluid manifold and strainer and spray gun.

(Airless spray system is development of Binks Manufacturing Company, 3114 Carroll Ave., Chicago, Ill.)

Check 3191 opposite last page.

Glass drainline system uses recently developed Teflon 100-X

Lightweight glass drainline system will not corrode or leak at the joints. System features a one-piece coupling for making quick, permanent compression joints.

Coupling consists of a stainless steel shell, a rubber

sleeve, and a liner of Teflon 100-X, a material that is as corrosion-resistant as the glass. With the coupling, the joint can be made quickly by inserting both ends of the glass pipe into the coupling and turning a single nut.

Drainline system will handle working pressures to 50 psig and temperatures to 250°F. Diameters of the borosilicate glass range from 1½-6 inches.

(Glass drainline system is development of Corning Glass Works Company, Corning, New York.)

Check 3192 opposite last page.

Polypropylene pumps resist solvents and acids

Two polypropylene centrifugal pumps possess excellent resistance to solvents, greases, oils and many common acids and chemicals at temperatures to 300°F.

Polypropylene casing is totally protected by cast iron frame which gives added support. Molded impellers are of a dynamically balanced design. Pumps are equipped with mechanical shaft seals in a range of materials to cover specific corrosive applications. Pumps offer a capacity range from 2 to 80 gpm.

(Polypropylene pumps are product of Vanton Pump & Equipment Corp., Div., Cooper Alloy Corp., Ramsey Ave., & Bloy St., Hillside, N.J.)

Check 3193 opposite last page.

"Wow! He must have a dandy leak!"

Daniel D. Adkins, Goodyear Atomic Corp.

with oil-soluble ALKATERGE®-T

The outstanding performance of Alkaterge-T as an oil-soluble corrosion inhibitor measures up to all expectations.

We ascribe part of this success to its very powerful adhesion to metallic and other hydrophilic surfaces. The force required to break this adhesion has been measured at 10,500 psi – highest of any compound tested! Alkaterge-T is a big molecule and with this adhesion, powerful protection would be expected by most corrosion engineers. But Alkaterge-T has a plus value, too. Mildly alkaline, it will tie up any trace of acidity that may develop, yet it is harmless to brass.

CSC's Alkaterge-T has very good lubricity properties and is a powerful emulsifying agent for water-in-oil emulsions which are unaffected by hard water. As little as 1% will emulsify 80% water into aliphatic hydrocarbons and form a fluid, stable emulsion. In lubricating formulations, Alkaterge-T tends to prevent sludge formation resulting from moisture pickup. It should also be evaluated as a liquefier for water-in-oil sludges.

Can *you* use Alkaterge-T? The mounting evidence suggests you can – especially if you make rust preventive oils, lubricants, cutting oils, extruding oils, transformer oils, corrosion resistant greases, and spinning and throwing oils for the textile industry. *Mail the coupon for data and sample!*

INDUSTRIAL CHEMICALS DEPARTMENT
COMMERCIAL SOLVENTS CORPORATION
260 MADISON AVENUE, NEW YORK 16, N. Y.

Please send me: ☐ *Technical Data Sheet No. 3A* ☐ *Sample of Alkaterge-T*

Name_____ Title_____

Company_____ Street_____

City_____ Zone_____ State_____

Check 3194 opposite last page.

CONTROLS CORROSION *in Gas Scrubbing Systems!*

Vancoram Sodium Metavanadate

($NaVO_3 \cdot xH_2O$)

Corrosion has been effectively controlled in nitrogen gas and carbon dioxide generators where sodium metavanadate has been employed. In an alkaline amine system for absorbing acid gases, sodium metavanadate helps to form an insoluble oxide coating which protects the closed circuit process from attack by corrosive by-products.

In a typical nitrogen gas system, the monoethanolamine solution containing 10 to 15 lb. of Vancoram Sodium Metavanadate, requires replacement only once a year. Both equipment and solution are protected to a far greater degree than by any other additive.

Write for further information about Vancoram Sodium Metavanadate as a corrosion inhibitor in alkaline amine systems.

VANADIUM CORPORATION OF AMERICA

Producers of alloys, metals and chemicals

420 Lexington Avenue, New York 17, New York

Chicago • Detroit • Cleveland • Pittsburgh

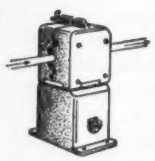
Check 3195 opposite last page.

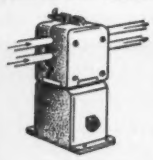
PUMPING IDEAS

POSSIBLE ONLY with a SIGMAMOTOR PUMP

MOVE CORROSIVE LIQUIDS

Material being pumped never comes in contact with pump mechanism. Wave-like motion of steel fingers forces material through Tygon tubing. By changing size of tubing, capacity can be increased or decreased. Pump housing opens for removal and insertion of tubing.



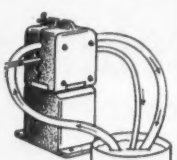


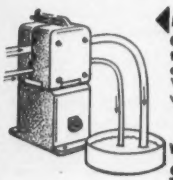
PUMP 2 OR 3 DIFFERENT LIQUIDS SIMULTANEOUSLY

Some models will accommodate up to four tubes so that four different liquids can be passed through the pump at one time without danger of contamination.

FEED AND MIX

One or more tubes can be feeding material to a mix while a larger tube is recirculating the liquid to produce agitation and thorough mixing. Viscous materials can be pumped without danger of gumming or plugging. Remove tube and pump is clean.





METER ADDITIVES

One or more additives can be pumped to a solution in the exact amount desired by selecting the correct size of tubing and regulating pump speed. Various controls can be incorporated to close valves ahead of pump.

Capacities from 0.5 cc. per min. to 4.5 G.P.M.

Write for complete information on sizes and capacities.

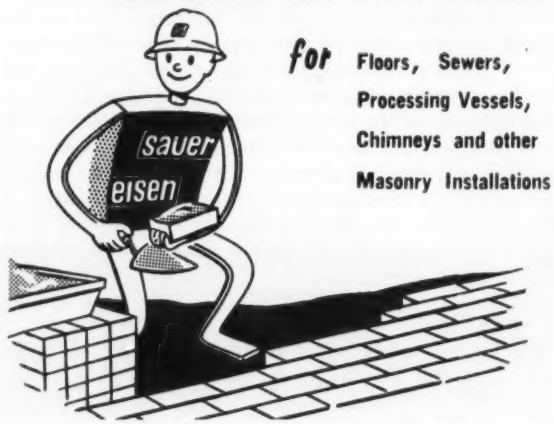
SIGMAMOTOR, INC.

18 N. Main Street • Middleport, N. Y

Check 3196 opposite last page.

Specify this better Corrosion-Resistant Mortar

for Floors, Sewers, Processing Vessels, Chimneys and other Masonry Installations



Sauereisen Resin Cement No. 40 has excellent adhesion to acid brick and tile, withstanding acids, alkalies, foods, oils, water and steam. Ask for Data Sheets.

Sauereisen Cements Co., Pittsburgh 15, Pa.

SAUEREISEN RESIN CEMENT No. 40

Check 3197 opposite last page.

Clear epoxy coating provides resistance to chemical fumes

Uses: For protecting equipment against acids, alkalis and petroleum solvents.

Features: Clearness of coating permits it to be applied to printed surfaces or dials where maintenance of original surface appearance is desired.

Description: Coating is a pure epoxy product. It can be applied to inside or outside surfaces of metal, wood or concrete. It may also be applied to inside of tanks containing corrosives. Coating has good adhesion and flexibility.

(Tropoxy No. 2 Clear coating is product of Tropical Paint Company, Cleveland 2, Ohio.)

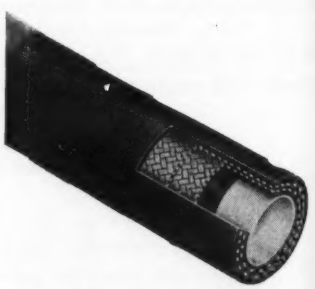
Check 3198 opposite last page.

Teflon-lined hose easily cleaned

Resists temperatures to 325°F, pressures to 1500 psi

Uses: Hose is especially suited for hot paint and lacquer spraying processes, for flexible connections in process equipment handling corrosives, caking slurries or solvents, and for conveying pharmaceuticals and other products requiring easy cleaning.

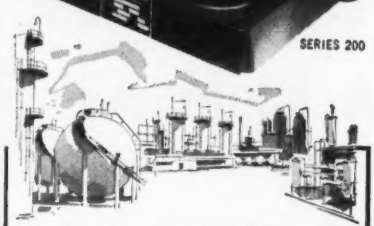
Features: Since the material will not stick to the Teflon tube, cleaning and sterilization are easily accomplished. Temperatures to 325°F and working pressures to 1500 psi are acceptable, depending on



Hose will withstand all chemicals except fluorine gas, chlorine trifluoride and molten alkali metals

ACCURATE CHEMICAL FEEDING

FROM .65 gph TO 1624 gph



AMERICAN PROPORTIONING PUMPS have repetitive metering accuracy of ± 1% when operating between 10% and 100% of capacity. Feed precisely metered fluids or slurries in all ratios, with controlled process variables.

- interchangeable liquid ends
- spherical self-aligning bearings on crank and crosshead
- crossheads of hardened and ground steel ride on cast iron
- nylon dust covers protect bearings
- NEMA frame motors
- heavy duty reducers

Send for free bulletin.

SERIES 100
Simplex models pump up to 13.10 gph at maximum pressure of 1000 psi. Duplex models double that capacity.

SERIES 200
Simplex models pump up to 812 gph at maximum pressure of 1000 psi. Duplex models double that capacity.

AMERICAN METER COMPANY
INCORPORATED ESTABLISHED 1836
pump division
3300 PHILMONT AVE., PHILADELPHIA 18, PENN.

Check 3199 opposite last page.

size and type of hose.

Description: Hose consists of a Teflon tube bonded to the hose body. Plies of high-tensile cotton cords or braided steel wire form the strength members, securely bonded to the tube cover.

Hose is regularly available in diameters to 1¼" in 15 to 50′ lengths, with brass or stainless steel fittings.

(Flexlon hose is product of Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N. J.)

Check 3200 opposite last page.

Hot nitric, sulfuric at 200°F withstood by floor topping

Problems: Floor made of acid-proof brick and membrane in a chemical plant was a constant source of difficulty. This was an upper floor subjected to constant vibration from operating equipment to spillage of 80-90% nitric and sulfuric acids at temperatures in excess of 200°F. Floor leaked so badly that the acids dripped to the floor below and the manufacturer was afraid of losing the reinforcing steel.

Solution: The manufacturer exposed a sample of Ceilcrete 6400, a modified polyester, to concentrated nitric acid. The test indicated that the material had no ill effects.

In the summer of 1958, on the basis of this test, plant installed Ceilcrete 6400 reinforced with a heavy glass fabric on the floor underneath a nitric acid concentrator.

Results: Reinforced polyester floor has satisfactorily withstood the hot concentrated nitric and sulfuric acids.

(Ceilcrete 6400 is product of The Ceilcote Co., Inc., 4832 Ridge Rd., Cleveland 9, Ohio.)

Check 3201 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

This Ampco Pipe has a ¾" wall, to handle sulphuric acid sludge in oil-company operation.

Sulphuric Acid Sludge No Problem

for major oil company,* in 1000-lb. transfer service

Its Ampco Pipe and Fittings resist corrosion

Ampco Pipe successfully handles problem liquids like these:

Boiling sulphuric acid (up to 50%)
Hot concentrated caustic solutions
Phosphoric and acetic acids
Phthalic anhydride
Phenols
Furfural
Brine

*Name upon request

Many other companies avoid corrosion shutdowns this same way.

Ampco Pipe is made from an exclusive aluminum-bronze alloy that . . .

(a) Resists many acids and caustics.
(b) Withstands the action of abrasive solids in suspension—resists cavitation-pitting.
(c) Has a Brinell hardness of 150 and tensiles up to 70,000 psi.
(d) Stands up under wrenches and hammers, without thread distortion and subsequent leakage.
(e) Has high velocity tolerance — flow rates of 18-20 fps.

You can get Ampco Pipe in all standard sizes, many from stock. Fittings are available to 3000 psi; flanges, to 5000 psi.

Write us concerning *your* problem.

AMPCO®

AMPCO METAL, INC.
Dept. 131-G, Milwaukee 46, Wis. • West Coast Plant, Burbank, Calif.

THE METAL WITHOUT AN EQUAL

Check 3202 opposite last page.

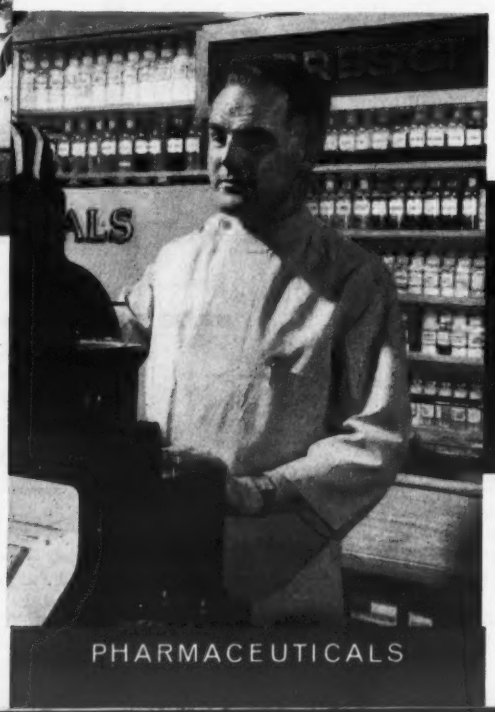
Propylene glycol U.S.P.

. . . is available from Celanese in commercial quantities. Here is a source you can depend on for consistency . . . odor-free quality and blandness . . . excellent solvent power and hygroscopic characteristics . . . outstanding emulsifying and wetting action.

For technical data, write:
Celanese Chemical Company, a Division of Celanese Corporation of America, Dept. 591-G, 180 Madison Ave., New York 16, N. Y.

Celanese ®

Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver.
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16.



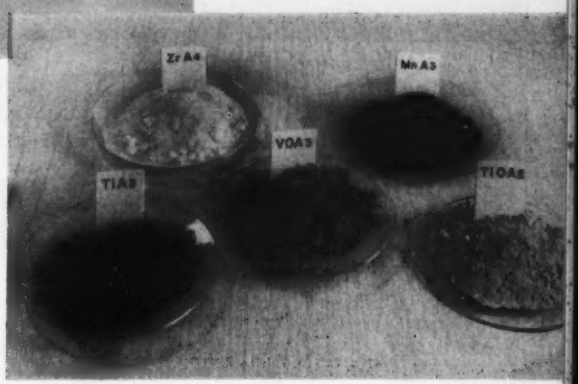
Celanese
CHEMICALS

For more information on product at left, specify 3203 see information request blank opposite last page.

PROPERTIES OF REPRESENTATIVE METAL ACETYLACETONATES

Valence State	Metal	Color	Crystal Structure	Melting Point	Boiling Point	Sublimation	Solubility: Water	Solubility: Benzene (g/100 cc)	Solubility: Ethanol	Density*
Monovalent	Na^+	White	Hexagonal Plates	218°C.	d.		Sol.	Insol.	Sol.	d_4^{20} 1.213
Divalent	Be^{++}	White	Monoclinic	108°C.	270°C.	Readily	Sol. hot	30	Sol.	d_4^{20} 1.108
Trivalent	Al^{+++}	White	Monoclinic	193°C.	314°C.d.	140°C., 10mm.	<3.3%	41.6	V. Sol.	d_4^{20} 1.204
Tetravalent	Zr^{++++}	White	Dihydrate	193°C.	d.	Slight at 82°C., 0.001 mm.	Insol.	7.0	200 g/l.	d_4^{25} 1.415

*Superscript indicates temperature of the density measurement as compared to the density of water at 4°C.



Some newer acetylacetonates. A=the acetylacetone radical $C_5H_7O_2$

High Solubility and Stability Plow Fertile Fields For Metal Acetylacetonates

Catalysis and polymer building are only two of many promising uses for versatile family now entering commercial stage

RAYMOND J. DZIMIAN and JOHN R. WARNER

Technology Department
Union Carbide Metals Company
Div. Union Carbide Corporation

Chemical compounds of heavy metals show promise as additives for promoting desirable properties as process-improving intermediates or catalysts. Many currently available compounds, however, have undesirable properties which limit their utility in organic systems.

Unlike inorganic salts of the heavy metals, acetylacetonates are highly soluble in many organic solvents, thus extending their usefulness to a wider range of processes. In addition, their aqueous and organic systems are neutral and most of them are resistant to hydrolysis. Because of coordination within the molecular structure, these compounds are very stable, and many of them can be distilled without decomposition.

Metal salts of acetylacetone are being studied with interest for applications in the manufacture of rubber, plastics, gasoline, lubricating oils, paints and enamels. Attractive possibilities also exist for uses as diverse as insecticides, addition agents in electroplating baths, and rust solvents.

Catalytic Agents

Metal acetylacetonates present a promising array of properties. Since these chemicals are soluble in organic solvents, they provide an easy means for carrying metals into many classes of industrial materials. Here, the metals can exert their characteristic effects.

Catalysis is one of these effects. Metallic acetylacetonates have been recommended as catalysts for the oxidation of hydrocarbons, for acidolysis reactions, for polymerization of unsaturated hydrocarbons and silicone monomers. They function as drying agents in linseed oil and as accelerators for the vulcanization of rubber.

Use of these metal salts as ignition and combustion catalysts in gasoline and motor fuels has been explored with particular thoroughness. Addition of fractional percentages of certain acetylacetonates improves anti-knock value and increases engine cleanliness. In lubricating and fuel oils, they catalyze combustion, prevent formation of sludge and hard carbon deposits, and act as soot-removal agents.

These compounds may ultimately have a significant impact on jet and rocket performance. Utility of metal acetylacetonates as combustion promoters in jet fuels is particularly noteworthy. It is reported that chromic acetylacetonate boosts markedly the power output of nitromethane when used in a rocket motor and decreases sensitivity of nitromethane to detonation under shock. Ferric acetylacetonate and others are be-

Amino-Hydrogen Substitution (e.g. Alkylation, cyanoethylation, carboxyethylation). Secondary amines formed, but "steric control" retards tertiary amine formation.

$$t\text{-}RNH_2 \longrightarrow t\text{-}RNH\text{—}R'$$

Straight-chain amines give a mixture of secondary and tertiary amines.

Reaction with Aldehydes.

$$t\text{-}RNH_2 + R'CHO \longrightarrow t\text{-}RN = CHR'$$

stable aldimine

Straight-chain amines and aldehydes normally give unstable derivatives.

Oxidation.

$$t\text{-}RNH_2 \xrightarrow{KMnO_4} t\text{-}RNO_2$$

Straight-chain amines give complex, unpredictable products.

Preparation of t-Alkylcyanamides.

$$t\text{-}RNH_2 \xrightarrow[NaOH]{Cl_2} [t\text{-}RNHCl] \xrightarrow{NaCN} t\text{-}RNH\text{—}CN$$

With straight-chain amines, this reaction requires close control, since the cyanamides react further in alkaline medium to form complex products.

Rohm & Haas

t-ALKYL AMINES...

for "Steric Controlled" reactivity

In many reactions, t-alkyl primary amines show unusual reactivity not exhibited by the straight-chain isomers. Why?—"Steric Control", resulting from the attachment of the amino group to a tertiary carbon in the t-alkyl amines makes the big difference. Four reactions that demonstrate the effect of this structural difference are given at the left.

Why not explore further the potential of these amines? Write to Dept. SP-16 for samples and a 44-page book giving many more t-alkyl amine reactions.

ROHM & HAAS t-ALKYL AMINES

Primene 81-R: 12-14 carbon t-alkyl primary amine
Primene JM-T: 18-22 carbon t-alkyl primary amine
t-Butylamine **t-Nonylamine**
t-Octylamine **Menthane Diamine**

PRIMENE *is a trademark, Reg. U.S. Pat. Off. and in principal foreign countries.*

Chemicals for Industry

ROHM & HAAS COMPANY
WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Check 3204 opposite last page.

ing used as solid fuel additives.

Presenting a broad spectrum of possible uses, these metal chelates could also serve plastics industry. Proposed uses here include polymerization catalysts, stabilizers for acrylonitrile polymers, regulators for methacrylate polymerization, and curing agents for epoxy resins. They promote the adhesion of foamed urethane plastics to covering materials of all kinds, pointing the way to an important architectural use in manufacture of curtain wall elements. Titanium and titanyl acetylacetonates have been investigated as a cross-linking agent in cellulosic lacquers to increase strength.

Polymer Builders

Thermally stable, semi-organic polymers based on metal acetylacetonate structures are also potentialities. Products capable of being molded, spun or cast have already been prepared. Although preparation of very high molecular weight polymers remains a problem as yet unsolved, shorter chains are easily formed by several methods.

For example, metal acetylacetonates will react with tetraketones in aqueous or organic solution, with or without alkali additions to effect precipitation. Method of building chains involves melting the metal chelate with a bis-β-diketone and boiling out byproduct acetylacetone or acetic acid to the desired product viscosity. By melting beryllium acetylacetonate with terephthaloyldiacetone and distilling out some acetylacetone, a solid, resinous polymer melting above 285°C is obtained.

Polymers also result from refluxing a bis-β-diketone over a metal oxide, carbonate, or basic acetate, with elimination of water, carbon dioxide, or acetic acid.

The high degree of stability and resistance to hydrolysis of these chelates form the basis for methods of extracting metals from solutions and ores. Aqueous solutions of

copper and zinc have been extracted using acetylacetone. Partition is so sharp that analytical separation could be based on the method. Considerable work along these lines has been done in Union Carbide Metals Company's research laboratories at Niagara Falls, N.Y. Experiments conducted here in solvent extraction techniques have indicated that 90 to 95% of the metal values could be leached from manganese and uranium ores.

Chemical Structures

Acetylacetone, whose enol form is a weak acid with dissociation constant $K_a = 1.12 \times 10^{-9}$, readily forms metal salts. Acetylacetonates of virtually all the metals in the periodic table have been prepared and reported in the literature. These compounds are characterized by unusual thermal stability, volatility, and solubility in organic liquids.

They are not very soluble in water and their dissociation into ions is slight. Thus, copper acetylacetonate is stable to boiling in amyl alcohol, even on addition of anhydrous or concentrated aqueous K_2CO_3, although it is immediately destroyed by KOH.

In general, metal acetylacetonates are chelate compounds, that is, heterocyclic rings with central metallic atoms. They have the formula:

$$M(O\text{-}\overset{\overset{CH_3}{|}}{C}=CH\text{-}CO\text{-}CH_3)_x$$

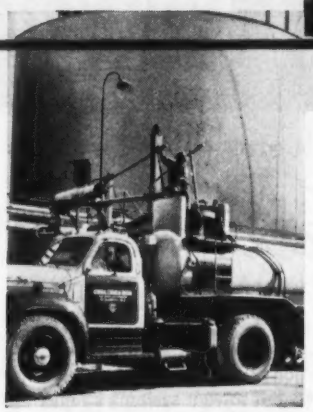
where x is the valence of the metal M.

Volatility of the metal derivatives is quite remarkable and is an illustration of the bond strengths in these compounds. Chelated structure given should be completely non-polar, yet the degree of polarization found by dielectric constant and dipole moment measurements, both in the liquid and gaseous states, is higher than expected by a factor of 50%, and indicates some type of internuclear polarization within the molecule.

Now that this highly inter-

To recover spent sulfuric, call on the leader in sulfuric

GENERAL CHEMICAL



Of General Chemical's 21 sulfuric plants, 15 are equipped to handle spent sulfuric! Here are their locations:

Anacortes, Washington
Barnet, British Columbia*
Baton Rouge, Louisiana
Buffalo, New York
Denver, Colorado
East St. Louis, Illinois
Elizabeth, New Jersey
El Segundo (Los Angeles), California
Hegewisch (Chicago), Illinois
Newell, Pennsylvania
North Claymont, Delaware
Port Chicago (San Francisco), California
Richmond (San Francisco), California
River Rouge, Michigan
Valleyfield, Quebec*

*In Canada: Allied Chemical Canada, Ltd.

If you are seeking to recover spent sulfuric acid from your operations and your plant is in the vicinity of any of those listed above, it may pay you to talk to General Chemical.
As the nation's leading sulfuric producer, General has years of experience in recovering many types and strengths of spent acid for its customers. While all cannot be reclaimed, we will be happy to review the economics of recovering yours. As always, the assistance of our technical service staff is readily available to help solve any spent acid handling and disposal problems you may have.

Basic to America's Progress

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N.Y.

Check 3205 opposite last page.

esting group of compounds is becoming commercially available, much wider use is anticipated. Heavy-metal acetylacetonates of such metals as chromium, copper, cobalt, iron, manganese, nickel, titanium, vanadium, and zirconium are being offered. Some of these can be prepared in more than one valence state of the metal.

(Metal acetylacetonates are products of Union Carbide Metals Company, Div. of Union Carbide Corp., 30 E. 42nd St., New York 17, N.Y.)

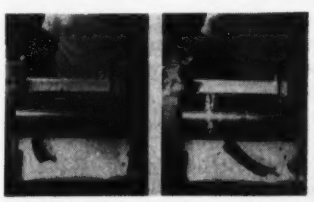
Check 3207 opposite last page.

More uniform dispersing ups economy, efficiency of rubber accelerator

Gives shorter mixing cycles and lower reject rates

Uses: Accelerator is supplied for use in natural, SBR and nitrile rubber products. It was developed particularly for electrical wire insulation and thin-walled molded products.

Features: Factory trials indicate that rubber processors will obtain better and more uniform dispersions for greater efficiency and economy. Shorter mixing cycles, lower reject rates, and possible elimination of refining and master batching are some process savings that should be realized.



Cleanliness of back roll (left) shows excellent dispersibility of MBTS accelerator. Other products of this type (right) leave undispersed particles caked on roll

Description: Rubber accelerator, benzothiazyl disulfide (MBTS) is an improved form of material available commercially for some time. It is a light colored product

Highest toluene dilution ratio

with National® **NADONE®**

(CYCLOHEXANONE)

One of the most powerful solvents available at a volume-production price, NADONE Cyclohexanone can cut the overall cost of solvent systems for organic coatings.

The addition of a small percentage of NADONE permits an increase in the volume of diluent that can be successfully incorporated in the solvent system. In nitrocellulose lacquers, for instance, NADONE solutions have a 6.3 toluene dilution ratio. Comparably high ratios obtain for other resins and diluents.

Conversely, NADONE solvent power makes possible higher solids content in resin-solution formulations.

An added advantage: Inclusion of NADONE prevents separation of resins and oils in solution and during evaporation of solvent from the film.

Other interesting, cost-saving uses of NADONE are:

- As a detergent-additive in lube oils to minimize carbon and sludge formation.*
- To improve fractional solvent extractions.
- As a degreasing solvent or fortifier for lower-power degreasers.
- To make better paint removers, inks, adhesives, pesticides, etc., etc.

WRITE FOR TECHNICAL BULLETIN I-19 B

This 32-page bulletin gives details on these and other applications of NADONE, contains complete properties, reactions and a valuable list of 148 literature references. We'll gladly send you a copy of this bulletin and, if you wish, a liberal working sample of NADONE for your investigations.

*U.S. Patent 2,389,608

NATIONAL ANILINE DIVISION
40 RECTOR STREET, NEW YORK 6, N. Y.
Atlanta Boston Charlotte Chicago Greensboro Los Angeles
Philadelphia Portland, Ore Providence San Francisco
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Allied Chemical

Check 3206 opposite last page.

...with LAMPORTS JOB ENGINEERING

With hundreds of different fibers, constructions and grades of filter media available, it takes a specialist to guide you to the most efficient and economical material for any given job. Lamports engineers are qualified by years of experience in the field to advise you on any filtration problem. Double-check your present media with us, or let us help you plan your next installation. Technical assistance without obligation. Call, write, wire, or TWX.

THE *filter media are the* HEART *of the filtration system!*

See our advertisement in Chem. Eng. Cat.

Lamports COMPANY

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Phone: MA 1-3315 Teletype CV-768

Check 3208 opposite last page.

GOLD SICON withstands 500°F.

Gold SICON protects the grill and grill pouch of this attractive Quaker space heater under temperatures of over 500°F., without peeling, flaking, powdering or discoloring. *And it will retain its bright appearance indefinitely!* Do as Heil-Quaker did. Test SICON . . . up to 1000°F. for Sicon-Aluminum or black . . . from 500° to 650°F. in gold or other decorative colors. Write for Sicon brochure and free sample offer . . . today! Dept. G-3

SICON, protects and preserves—wherever there is heat.

Check 3137 opposite last page.

meeting the following specifications:

Content, % min,	91.0
Free MBT, %	Less than 2.0
Lubricating additive, %	Less than 3.5
Dedusting agent, %	Less than 2.5
Moisture, %	Less than 0.5
Ash, %	Less than 1.0

(MBTS accelerator is the product of American Cyanamid Company, 30 Rockefeller Plaza, New York 20, N.Y.)

Check 3209 opposite last page.

Fluorosilicone sponge resistant to fuels and lubricants

Uses: Sponge is highly suitable for soft gasketing, vibration damping, or other applications where there is extreme low or high temperatures with simultaneous exposure to fuels and oils.

Dense, uniform sponge withstands extremes of temperature

Features: Material provides outstanding resistance to fuels and lubricants at extreme high temperatures. In addition, it possesses immunity to aging, ozone and weather hardening; has excellent dielectric properties, and good compression set resistance.

Description: Fluorosilicone sponge rubber has a dense, uniform, non-absorbing closed cell structure. It has little change in physical properties over a temperature range of −100 to +500°F. Product, Cohrlastic 10530, is available in 12″ x 12″ and 24″ x 24″ molded sheets in thicknesses of ⅛″, 3/16″ and ¼″.

(Cohrlastic 10530 fluorosilicone sponge is product of Connecticut Hard Rubber Co., 407 East Street, New Haven 9, Connecticut.)

Check 3210 opposite last page.

DAWE'S

a dependable source for

SODIUM GLUCONATE and GLUCONIC ACID

Promptly available in any quantity.

Warehouse stocks across the country.

Dawe's high quality is assured.

Write for technical data and samples.

DAWE'S LABORATORIES, INC.
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Italy — Via G. Negri 4, Milan
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Dawe's

Check 3211 opposite last page.

THIS CATALYST HAS LONG HALF-LIFE AT HIGH TEMPERATURE

LUPEROX 2,5 Dimethyl Hexane 2,5 Dihydro Peroxide

Fills the demand for a solid, non-volatile, high temperature hydroperoxide polymerization catalyst.

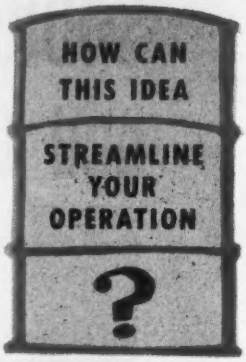
WRITE FOR DATA SHEET

LUCIDOL DIVISION
WALLACE & TIERNAN INCORPORATED
1740 MILITARY ROAD
BUFFALO 5, NEW YORK

Check 3212 opposite last page.

STERILE, COLD FILLING CHEMICAL MATERIALS IN 55 GAL. DRUMS

Here's one way *sterilpac* has streamlined the *food* processing industry: sensitive concentrates now retain their flavor, color, texture, and body without additives or preservatives—and *sterilpac*-filled concentrates *require no refrigeration!* That's one way. Write—or give us a call—to find out others.



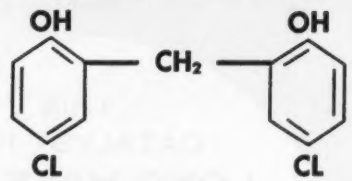
New development for Chemical Industry . . .

sterilpac DRUM FILLING SYSTEM

by **Thermovac inc.** A subsidiary of Rheem Manufacturing Co.

816 E. Hazelton Ave. • P.O. Box 209 • Stockton, Calif. • HOward 6-4385

Check 3213 opposite last page.



Mildew or Bacteria problem?

G-4®

(DICHLOROPHENE)

Here is a potent and versatile fungicide and bactericide that offers special advantages in a wide variety of applications. It may be *exactly* the preservative you are seeking to solve a deterioration problem or improve the salability of a product.

G-4 is safe to use, and it is used in cosmetic, pharmaceutical and veterinary products. It is light in color, low in odor. Other uses include textiles, cutting oils, disinfectants, paper, emulsions. We welcome your request for samples and technical information.

SINDAR® Corporation
Industrial Aromatics and Chemicals
321 West 44th Street, New York 36, N.Y.

Check 3214 opposite last page.

Thermosetting acrylic offers seven performance 'plusses':

1—Very high hardness (Pencil hardness of 4H)

2—Excellent gloss (Photovolt readings of 88-93)

3—Very good color properties and excellent retention of color and gloss with age

4—Superior resistance to grease and staining

5—Excellent resistance to solvents

6—Exceptional resistance to detergent and soap solutions

7—Very good resistance to printing and to deformation at elevated temperatures

Uses: Polymer is recommended as a vehicle for baking enamels and many types of specialty coatings. It also appears interesting for use in metal decorating finishes; coatings for steel drums; clear coatings for brass; vinyl topcoats, silk-screen inks, paper coatings, organosol primers, and coatings for vacuum-metalized plastics or brass.

Because of resin's unusual compatibility it can be used to modify and upgrade conventional alkyd-melamine coatings. It can be used with a broad variety of film-forming resins. Particularly useful vehicles are obtained when it is combined with epoxy resins.

Features: Highly crosslinked acrylic vehicle is reported to be considerably superior to alkyd-aminoplast resin combinations in resistance to solvents, soap and detergent solutions, and staining agents. It is easy to apply, can be sprayed at high solids, and shows good adhesion to phosphate-coated, bare metals. This indicates that one-coat enamel systems are practical.

Thermosetting-acrylic coating resin is result of an extensive research program in cross-linking acrylics. It is said to show substantial improvement over earlier entries in the field. Baked enamel films based on this product show an exceptional combination of performance properties (see tabulation under headline).

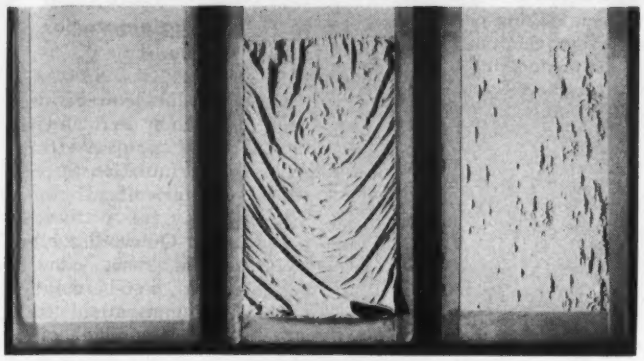
Salt spray resistance is excellent. Tests were made on Bonderite panels which were sprayed with one coat of enamel and baked at 300° F for 30 minutes. Coated panels were then scratched and exposed to 20% salt fog for 500 hr. A good quality melamine alkyd enamel was included in the test as a reference standard.

Enamels containing this thermosetting acrylic had only very slight undercutting at the scratch marks; no blistering occurred. On melamine-alkyd panel, enamel was undercut 1/16 inch at the scratches.

Description: Acryloid AT-50 consists of a thermosetting acrylic polymer dissolved in an organic solvent. Solvent is 60% xylol, 22% butanol and 18% methyl cellosolve. Other physical characteristics are:

Solids content, %	**50**
Viscosity	**U-X**
Color (APHA), max	**50**
Lb/gal	**8.4**
Acid number	**13-14**

Since cross linking of the acrylic polymer in Acryloid At-50 occurs during exposure to heat, baking schedules are important considerations. An excellent baking schedule for enamels, with or without epoxy resin addition, is 300°F for 30 minutes. This bake pro-



ACRYLOID AT-50 WITH AN EPOXY RESIN | COMPETITIVE CROSS-LINKED VEHICLE | ALKYD-AMINE RESIN

Detergent resistance of white enamels after immersion for 200 hr in a 1% Tide solution maintained at 165°F

duces a film with outstanding hardness, gloss, color retention, and resistance to printing, stains, detergents and solvents.

Film hardness and resistance to solvents and detergents continue to increase as baking temperatures are raised above 300°F (30 minute bakes); 325 gives a pencil hardness of 6H, with all other properties still in top condition; at 350, however, adhesion begins to slip a little.

In a laboratory experiment, a bake of 30 seconds at 500°F, gave excellent adhesion on bonderized thin strip steel. In such short, high-temperature baking schedules, provision must be made to allow solvent flash-off in order to avoid blistering.

Practically every kind of pigment can be used in formulating with this vehicle, although some reds, such as toluidine or Monastral are partly soluble in the solvent combination used and give low gloss in enamel films. Toners that are not sensitive to acid are recommended for formulating enamels with maximum detergent resistance.

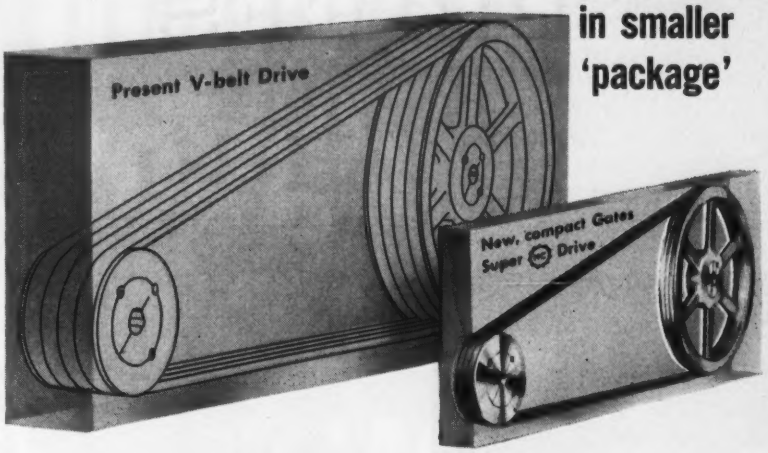
(Acryloid AT-50 is a product of Rohm & Haas Company, Washington Square, Philadelphia 5, Pa.)

Check 3215 opposite last page.

Formulation For A White Baking Enamel

	Pounds	Gallons
Roller mill grind		
Titanium dioxide	253.0	7.27
Acryloid AT-50 (50% solids)	253.0	30.48
Mix with		
Acryloid AT-50 (50% solids)	364.1	43.87
Xylol	96.9	13.46
Solvesso 150	25.0	3.37
Cellosolve acetate	27.2	3.36
Raybo 3(anti-silk agent)	0.5	0.07
Physical constants of enamel:		
Lb/gal 10.2	Pigment, %	45.0
Total solid, % 55.3	Vehicle, %	55.0

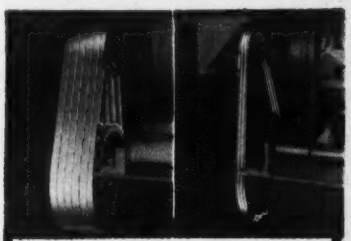
Same HP capacity in smaller 'package'



Industry cuts drive costs as much as 20% with Gates high capacity V-Belts

By putting power transmission in a smaller package, Gates 'performance-proved' Super HC V-Belt Drive has cut costs all along the line—for all kinds of industries—since its introduction more than a year ago.

As a replacement drive on equipment *inside* the plant, or as the drive on equipment *manufactured for sale* the Super HC Drive has enabled thousands of industrial users and OEM's to reduce sheave diameters 30% to 50%, overall drive space up to 50%, and drive weight 20% and more. *Initial drive cost has been cut as much as 20%.*



BEFORE ◄ AFTER ►

COMPARE: Conventional drive at left was replaced with Gates new Super HC V-Belt Drive at right. Three of Gates new, narrow HC V-Belts do the work of the former 6 standard width belts. In this application the new drive actually takes *one-third* the space of old!

Nation-Wide Engineering Service

A Gates Distributor can show you how to effect savings with Super HC V-Belt Drives. Ask him for your free copy of *"The Modern Way to Design Multiple V-Belt Drives,"* or write to The Gates Rubber Company Sales Division, Inc., Denver, Colorado.

TPA 535

The Gates Rubber Company, Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario

Gates — World's Largest Maker of V-Belts

Gates Super HC V-Belt Drives

Check 3216 opposite last page.

BRIEFS

about some sturdy caustic soda flakes
about a new sodium chlorate drum
on chlorine technical service

THICK ENOUGH FOR ROUGH TRAVEL . . .

these clean, strong caustic soda flakes get to you *full size*. Thin enough to dissolve quickly, they go right to work when you put them in process.

You can choose from four—regular, fine, crystal, and powdered. The first three are non-dusting. All four come to you in fast-to-work-with drums with big 18" diameter openings.

GET YOUR SODIUM CHLORATE IN THIS NEW DRUM . . .

with a tighter fit—a fit so tight it preserves the strength of any chlorate you leave in it.

Note that this drum has no lugs to open. The new lever opening makes resealing easier, too.

The new drum comes in both 100- and 450-lb. sizes.

CHLORINE TROUBLE—SPOTTED AND FIXED . . .

before it becomes serious. You can expect this kind of help from our technical service men making periodical inspections of your chlorine system.

You can get engineering help, too—for anything from revamping your present chlorine handling system to planning a completely new one.

To help you keep up with the most important developments in industrial chemicals, Hooker makes available to you authoritative bulletins and technical data sheets.

We provide further help by giving you the personal assistance of skilled technologists—men who have gained understanding of your problems through years of work in the industry.

Just write to us on your business letterhead with a statement of your problem.

For more information, check here and mail with your name, title and company address.

☐ Caustic soda ☐ Sodium chlorate ☐ Chlorine

HOOKER CHEMICAL CORPORATION
507 Forty-Seventh Street, Niagara Falls, N. Y.

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In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

HOOKER CHEMICALS PLASTICS

Check 3217 opposite last page.

CHEMICAL MATERIALS

This water-soluble resin shows no agglomeration when dissolved

Uses: Product can be used as a thickener in paint or topical drug preparations, cosmetic formulations, print pastes and agricultural chemicals.

Features: Quick-dissolving, water-soluble resin can be stirred into water solution without agglomeration. It is an efficient protective colloid and stabilizer and has a high tolerance for electrolytes. Nonionic thickener is compatible with anionics, cationics and nonionics.

Description: Cellosize hydroxy ethyl cellulose QP-4400 has a high thickening action, even in low concentrations. It is low foaming in water solutions. Product can be dry-blended or ground with pigments. It allows instant color development with phthalocyanine colors used to tint hot latex paint systems.

(Cellosize QP-4400 is product of Union Carbide Chemicals Co., Div. Union Carbide Corp., 30 E. 42nd St., New York 17, New York.)

Check 3218 opposite last page.

Developmental quantities of tetramethyl ammonium chloride available

A variety of intermediate chemical applications are predicted for tetramethyl ammonium chloride, now available in development quantities.

Specifications state that minimum purity is 98%. Water content is less than one percent.

(Tetramethyl ammonium chloride is product of Ansul Chemical Company, Marinette, Wisconsin.)

Check 3219 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

THAT'S INTERESTING

Petroleum in haze?

A blue haze seen over vegetated areas is petroleum in process of formation, Dr. Fritz W. Went of the Missouri Botanical Garden, St. Louis, Mo., suggests in an article in *Proceedings of the National Academy of Sciences* of Feb. 15.

He attributes the haze to a layer of asphaltic and bituminous particles created by hundreds of millions of tons of volatile hydrocarbons and near-hydrocarbons expelled into the atmosphere annually by living plants. These particles eventually rain down on earth, and in time, form petroleum.

Toothpaste dispenser

Dispenser, designed to be mounted on wall of bathroom, delivers brush length of dental cleaner on demand. Any size toothpaste tube can be loaded into the holder.

For more information on product at right, specify 3220 see information request blank opposite last page.

New markets through new molecules BUTYNEDIOL

$HOCH_2C \equiv CCH_2OH$

Low Cost Multi-Reactive Intermediate for the synthesis of previously inaccessible compounds

Butynediol is an economical raw material, with multiple centers of reactivity, that can be utilized as

a disubstituted acetylene, i.e., by addition: $HOCH_2C \equiv CCH_2OH \xrightarrow{R} HOCH_2\overset{R}{\underset{|}{C}}=\overset{R}{\underset{|}{C}}CH_2OH$

a glycol, i.e., by OH replacement: $HOCH_2C \equiv CCH_2OH \xrightarrow{X} XCH_2C \equiv CCH_2X$

to form cyclic compounds, i.e., trimerization:

$$3\,HOCH_2C \equiv CCH_2OH \xrightarrow{\text{catalyst}} \text{1,3,5-tris(hydroxymethyl)benzene}$$

In the synthesis of new agricultural chemicals, Butynediol has proved a convenient starting point for such products as wild oat herbicides, pesticides and defoliants.

Among the other derivatives are products used as pharmaceuticals, textile auxiliaries, corrosion inhibitors, high-energy propellents, and dye intermediates.

Supplied as a solid of 97% purity or in a 35% aqueous solution, Butynediol is in its own right a valuable specialty. It is remarkably effective as an electroplating brightener and corrosion inhibitor.

Write or call your nearest GAF representative for the new bulletin on Butynediol. This booklet reviews the physical properties, important storage and handling instructions, and its chemical reactions. It may suggest new areas of usefulness to you.

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Check 3221 opposite last page.

Developmental Chemicals Addendum

Here are some additional materials introduced from June 1959 through May 1960

Allied Chemical Corporation, Petrochemical Div., 61 Broadway, New York 6, N.Y.

509) **AC cleaning compound** — Solid. For cleaning injection molding machinery in plastics industry.

The Borden Chemical Company, Div., The Borden Company, 350 Madison Ave., New York 17, N.Y.

510) **Leucyl-β-Naphthylamide Hydrochloride (LNA)** — Wt Solid; MP 250. Assay of enzymatic activity of mammalian tissues and serum. Permits colorimetric procedure.

511) **Nitro BT** — Pale yellow solid. Superior reagent for cytochemical demonstration of oxidation-reduction enzyme system.

512) **Polyvinyl Chloride (VC-80)** —Wt powder. For injection molding; record mfgr. Fast plasticizer absorption at high levels. Relative vis 1.75.

513) **Polyvinyl Chloride (VC-100 PM, VC-105 PM)** — Wt powder. For powder mix extrusions. Relative vis of 2.25, 2.41 respectively.

514) **Pyridine 2-Aldoxime Methiodide (PAM)** — Yellow rohmbic cryst; MP 212-213. Specific reactivator of alkyl phosphate-inhibited acetyl cholinestrase. Relieves symptoms of parathion poisoning.

City Chemical Corporation, 132 West 22nd St., New York 11, N. Y.

515) **Brassilic Acid** — MP 110-112. Chemical Intermediate.

516) **Ethylamine Hydrochloride** — MP 106-108. Chemical Intermediate.

These listings were received too late to include in our June report on New Developmental Chemical Materials (see CHEMICAL PROCESSING, June 1960, page 49).

TWO WAYS TO GET MORE INFORMATION

on any listed product

READER SERVICE SLIP. Write in product number (given at start of each listing) on special box of handy slip opposite last page.

MANUFACTURERS' ADDRESSES are given above each group of compounds . . . should you prefer to write them direct.

517) **Ethyl w-Bromo-Undecanoate** — MP 188-190. Chemical Intermediate.

518) **Sebacic Anilide** — MP 200-201. Rubber Compounding.

Dearborn Chemical Company, Merchandise Mart, Chicago 54, Illinois.

519) **Dearcide 703** — Liquid. Biocide for control of bacterial slimes, algae in open recirculating cooling systems. Readily sol liquid; no toxic dust of fumes; high potency.

520) **Dearcide 707** — Liquid. Algae control in open recirculating systems. Readily sol; high flash point; high potency.

521) **Dearcide 717** — Liquid quaternary metallo-organic. Control of bio-fouling organisms. High potency; non corrosive; no toxic dust or fumes.

522) **Dearclad 765** — Liquid amine-cured epoxy coating. Protect underground pipelines or structural metal. Readily applied by two-component spray gun; 15 min cure.

E. F. Drew & Company, Inc., 416 Division Street, Boonton, New Jersey.

523) **Polyoxyethylene Lauryl Ether (Lipal 12 LA)** — Paste; MP 32. Emulsifier, sol agent. High sol power for perfume oils; stable to acids, alkalies; water wt.

524) **Polyoxyethylene Stearyl Ether (Lipal 15CSA)** — Solid; MP 45. Emulsifier; sol agent; gelling agent. Forms clear aqueous gels; stable.

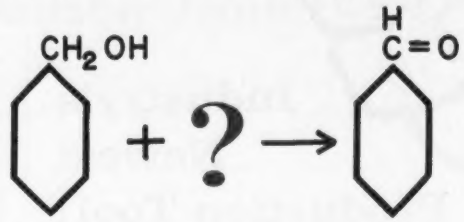
525) **Polyoxyethylene Tridecyl Ether (Lipal 6TD)** — Liquid; MP 20. Emulsifier; wetting, coupling agent. High tolerance for acids, alkalies, electrolytes.

E. I. du Pont de Nemours & Company, Industrial and Biochemicals Department, 10th &

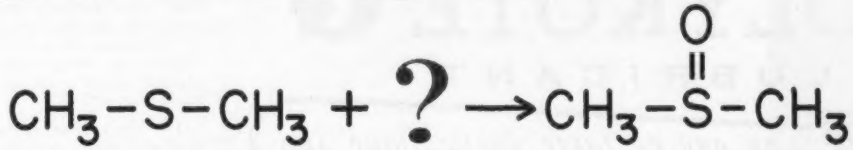
How would you conduct these difficult oxidation reactions?

PARTIAL OXIDATION:

Aromatic alcohol to aromatic aldehyde

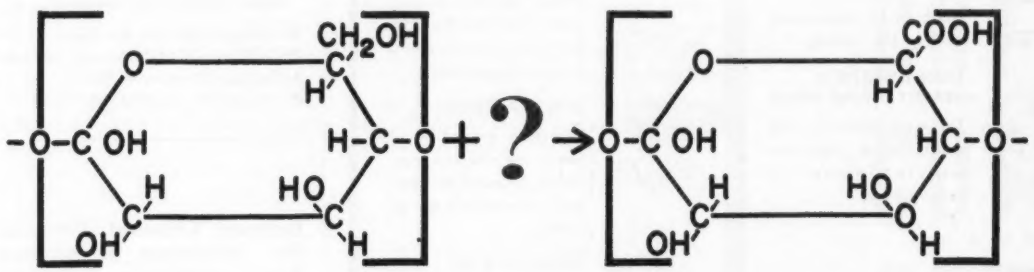


Organic sulfide to organic sulfoxide



SELECTIVE OXIDATION:

Starch or cellulose--alcohol groups only--to carboxyl groups



Allied Chemical Nitrogen Tetroxide, an abundant source of oxygen, may be the answer to *your* oxidation problems; it carries approximately 70% oxygen. Under mild conditions, half of this oxygen can be utilized; under more vigorous conditions, the total amount is available.

Nitrogen Tetroxide is a truly low cost oxidizer for reactions typical of those indicated above. It can be used in solutions at very low temperatures, such as NO in N_2O_4; in concentrated liquid form from −11° to 21° C.; in acids such as sulfuric and nitric; and as a gas in the form of NO_2 at elevated temperatures.

With a minimum of N_2O_4 content of 99.5% and less than 0.1% moisture, Allied Chemical Nitrogen Tetroxide is supplied in tank cars, one-ton, 150- and 125-lb. cylinders.

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For specifications and local offices, see our insert in Chemical Materials Catalog, pages 475-482 and in Chemical Week Buyer's Guide, pages 37-44.

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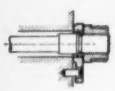

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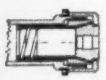

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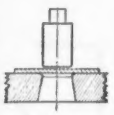
Prevents galling, seizing, metal pick-up and distortion.



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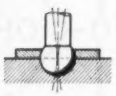
Makes difficult jobs easy and increases die life. Effective on punching and stamping tools.



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No galling or seizing.

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CHEMICAL MATERIALS

Market Streets, Wilmington 98, Del.

526) **1,4-Dichlorobutene-2** — colorless liquid; MP 3.5; BP 158. Int for adhesives, fungicides, textile treating agents, resins, plasticizers. Reactive allylic chlorines; di-functional.

527) **Glutaric Anhydride** — Cryst solid; MP 56.5; BP 148-50 @ 12 mm. Int for polyesters; cross-linking agent. Sol low-melting anhydride.

528) **bis-(Hexamethylene) Triamine** — Lt yellow sol; MP 33-34; BP 317. Epoxy curing agent; cross linker; rubber chem int. Available primary, secondary amino hydrogens.

529) **bis-(Hexamethylene) Triamine, Crude (Amine 248)** — Amber mixture; 60% distills between 125-245 @ 35 mm. Polyamide resins int; epoxy curing agent; corr inhib. Available primary and secondary amino hydrogens.

530) **Hexamethylenimine** — Colorless liquid; MP −37; BP 138. Int for pharmaceuticals, rubber accelerators, ag chem, corr inhib. Secondary amine; sol in polar and non-polar sol.

531) **Tyox Antioxidant** — Wt lard-like sol; mixture of lauryl, myristyl, cetyl thiodipropionates; MP 30-33; BP 211 @ 5 mm. Antioxidant for olefin polymers, foods, waxes. F.D.A. approved for food wrap.

Unless Otherwise Specified . . .

- Pressures are mm Hg (abs)
- Boiling points (BP) are at 760 mm
- Temperatures are in °C
- Solubilities are at room temp

Eastman Chemical Products, Inc., Subsidiary of Eastman Kodak Company, Kingsport, Tennessee

532) **n-Butyronitrile** — Liquid; BP 43 @ 50 mm. Pharm int. Reactions of a typical lower aliphatic nitrile.

533) **1,4-Cyclohexanedimethanol** — Liquid. Saturated polyester int. Two primary hydroxy groups; good thermal and hydrolytic stability.

534) **2, 5-Dihydroxybenzoquinone** — Solid; MP 216. Metal chelating agent; polymerization inhib; dyestuff coupling agent; dye, fungicide Int. More stable than most quinones; less skin irritation.

535) **N, N-Dimethylcyclohexylamine** — Liquid; BP 79 @ 50 mm. Promotes adhesion of polyurethane foams; enhances shrink resistance, water repellence of textiles.

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U.S.I. CHEMICAL NEWS

★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★

Sodium Dispersions Now Sold by Several Companies

Many types of sodium dispersions are now being sold commercially by several companies. These firms already prepare sodium dispersions for their own chemical manufacturing operations, and so are familiar with the techniques involved.

Sodium dispersions, of course, have been recommended for many years for their high surface area and, consequently, high activity in reactions such as Claisen condensations, Wurtz type reactions, sodium alcoholate preparations, metalations, preparations of sodium alkyls and aryls, polymerizations and many others. Until dispersions were offered for sale commercially, however, they had to be made by the user in situ as required. Some special equipment and operator training are needed for dispersion preparation, and it is believed that these needs may have discouraged use of dispersions on a broader scale in the past, especially where small quantities were involved. The availability of commercial dispersions now is expected to increase their use in chemical reactions.

One supplier offers two standard types of sodium dispersions. The first is a solid composed of 50% sodium and 50% paraf-

MORE

Chemistry Booklet for The Elementary School Teacher Supplied by MCA

"Matter, Energy and Change", a booklet containing a course of study in chemistry for elementary school children, is being offered to school supervisors and teachers at below-cost prices, as an educational service of the Manufacturing Chemists' Association.

The 50-page booklet attempts to supply up-to-date knowledge to the science educator in the rapidly growing and changing field of chemistry. It presents this knowledge by outlining a series of explorations for the children. For youngsters through third grade, there are explorations into materials, changes, water, air and plants. For older children through sixth grade, there are explorations into the nature of matter, chemical reactions, electricity and matter, chemical tests, crystals and photography.

This booklet represents a part of MCA's extensive aid-to-education activities, designed to stimulate the understanding of chemistry at many levels.

Up-To-Date Catalog On Ethyl Alcohol Now Available from U.S.I.

132-Page Book Contains Complete Information on Pure Ethyl Alcohol and Denatured Alcohol Formulations

U.S.I.'s new Ethyl Alcohol catalog has just been published. Type style and format of the up-to-date edition have been carefully selected for easy reading. Comprehensive and thoroughly documented, this illustrated catalog covers:

(1) Pure ethyl alcohol—properties, specifications, shipping data.

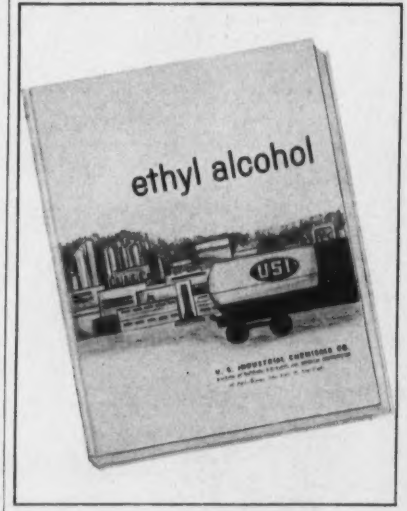
(2) Specially denatured alcohol formulas—authorized denaturants, compositions and uses; properties; shipping data.

(3) Completely denatured alcohol formulas—authorized compositions, specifications, properties, shipping data.

(4) Proprietary solvents: SOLOX®, FILMEX® and ANSOLS®—authorized compositions, uses, specifications, properties, shipping data.

In addition, there is a section on the general properties of ethyl alcohol, including graphs, tables and bibliography, and a section on methods of testing. Appendices include standards, tests and assays of the ACS, NF and USP; container descriptions; gauging techniques for drums, tanktrucks and tankcars; and methods of handling. A glossary of terms completes the volume. Sections are tabbed for quick

MORE



U.S.I.'s new Ethyl Alcohol catalog.

Complete Property Data On Pure Nitric Acid Published Recently

The most current and accurate information available on the physicochemical properties of pure nitric acid has been collected, evaluated and presented in a 23-page report in the April issue of *Chemical Reviews*, a bimonthly publication of the American Chemical Society. The report includes discussions and data on: various methods of preparing nitric acid; all physical properties; self-ionization; thermodynamic properties; stability. It concludes with a list of the 216 references the authors used in compiling their data.

This collected information should be of particular value to laboratory, design and theoretical workers. It should also be useful to those engaged in the production, handling and storage of highly concentrated solutions of nitric acid for rocket fuel applications, as well as industrial producers and users of the material in any concentration.

Polyethylene Pipe and Fittings Joined by Fast Heat Sealing Technique

A patented process has been reported for joining polyethlene pipe and fittings, using nothing but heat and a special tool of simple design. In the process, called "Polyfusion", the outside of the pipe and inside of the fitting are heated on the Polyfusion tool and joined together to form one homogeneous piece. Any conventional heat source—flame or electric—can be used. No glue, cement, solvent or other material is needed. It is reported that only 10 to 20 seconds are required to fuse a joint.

★ U.S.I. CHEMICAL NEWS ★

CONTINUED

Alcohol Catalog

reference and each section has a table of contents.

A 20-page Government Regulations supplement is contained in a pocket inside the back cover, so that it can be easily replaced when changes are made in federal regulations. You can obtain a copy by making a request on your company's letterhead.

CONTINUED

Sodium Dispersions

fin or naphthalene binder, shaped into one-pound bricks. The other is a liquid made up of 50% sodium and 50% mineral oil. The company also offers other liquid dispersions as required.

A second company is marketing a crushed solids dispersion containing 50% sodium and 50% napthalene, as well as a dispersion gel consisting of 50% sodium and 2% aluminum stearate in mineral oil.

Still another company supplies four standard types of dispersions: 30% sodium and 50% sodium in xylene, and 30% sodium and 50% sodium in special naphtha cuts. They will also supply mineral oil dispersions on request.

New Microporous Films of Polyethylene Repel Water But Transmit Vapors

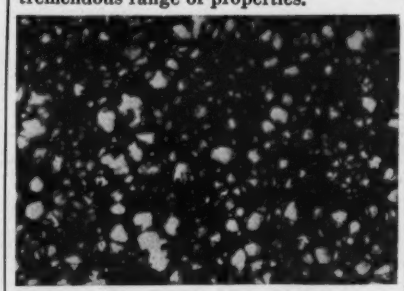
It is reported that a technique has been developed for producing extremely fine, uniform, interconnecting pores in polyethylene films. This makes the plastic vapor-transmitting and water-repellent at the same time. Films so prepared are being investigated for use in clothing, filters, medical equipment, solar water purification apparatus, electrodialysis equipment and other specialty applications.

As normally produced, these polyethylene films are said to have a porosity of about 80%, with all pores in the 8-12 micron range. Because of this extremely high void volume and the interconnecting structure, gases and vapors can diffuse through the films with very little interference. But because the polyethylene itself is hydrophobic, surface tension prevents water or aqueous liquids from penetrating the extremely fine pores. In this way, the material transmits water vapor but is completely water-repellent.

The pore structure is reportedly achieved through the use of starch as a leachable material. Polyethylene resin and starch are mixed, and the mixture is converted to sheet by any of the conventional methods such as calendering or extrusion. At this stage the starch in the sheet is encapsulated in very thin walls of polyethylene.

Next the sheet is immersed in boiling water to wet and expand the starch. Cornstarch, for example, will swell to well over twice its original volume. The expansion ruptures the plastic walls encapsulating the starch and results in the interconnecting pore structure. Starch is then removed by sulfuric acid hydrolysis and leaching.

It is claimed that by selecting starches of different particle sizes, altering the basic process, and varying the plastic formulation, a great variety of microporous plastic materials can be made having a tremendous range of properties.



Photomicrograph (200 magnification) shows typical pore structure of microporous polyethylene film. (Courtesy ESB—Reeves Corp.)

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Polyethylene in powder form, a new development for coating metals, textiles, paper, glass, etc., for molding and other purposes, is described in technical data bulletin now available. Said to open new uses for polyethylene. **No. 160**

Etching solution now on market makes fluorocarbon polymers bondable to other materials. Material is activated form of sodium in solvent. Extracts fluorine from surface, leaves carbonaceous film compatible with adhesives. **No. 161**

Health factors in safe handling of chemicals is subject of first in series of pamphlets on safety to be sold at nominal cost by MCA. Pamphlet is designed to acquaint non-chemists in chemical plants with toxicological terms, toxicity mechanisms, first aid principles. **No. 162**

New portable conductivity and temperature measuring Solu Bridge for measuring tidal movements, salinity, industrial pollution, etc. is now on market. Covers, in 3 ranges, 40-400,000 micromhos/CM specific conductance. **No. 163**

Portable water softener recently developed works by electric membrane process, is claimed 50 times more efficient than comparable electrical devices. Said to soften 2 gallons of hard water per hour on 10 watts of electricity. **No. 164**

Coagulant aids, described in new bulletin, are used in municipal and industrial water systems, waste waters, cold and hot process softening, oil field waterflooding, brine clarification, color removal, high solids-liquid separation. **No. 165**

New miniature infrared photoelectric scanner (proximity sensor) contains both light source and pick-up head in one small housing. Simplifies installation and operation in many counting and control applications. **No. 166**

New dispersants and inhibitors have been developed to prevent formation of sludge in fuel oils. Dispersants are dialkyl dimethyl ammonium chlorides. Series of 14 fatty amine derivatives comprise the group of inhibitors. **No. 167**

Chemical fume scrubbers of fiberglass-reinforced polyester resin now being designed. Units up to 47 feet high by 10 feet in diameter have been made. Plastic chosen for strength, lightness, chemical and flame resistance. **No. 168**

Story of chemistry is subject of new book now being sold. Part I includes Egyptian, Greek, Arabic chemical knowledge and Western work to discovery of oxygen. Part II carries through latest discoveries in nuclear chemistry. **No. 169**

PRODUCTS OF U.S.I.

Ethyl Alcohol: Pure and all denatured formulas; Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®M, ANSOL PR.

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Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methonine, Urethan USP, Intermediates.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertil er Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

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MICROTHENE ... Finely Divided Polyethylene Resin.

Animal Feed Products: DL-Methionine, MOREA® Premix (to authorized mixer-distributors).

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536) **2,4-Dimethylpentanol** — Liquid; BP 155.4-159.7. Terminating agent for polyesters; specialty sol. Only one beta-hydrogen atom.

537) **Hexamethylphosphoric Triamide (Inhibitor HPT)** — Liquid; BP 230-232 @ 739.4 mm. UV stabilizer for vinyls. Easily incorporated.

538) **Gentisic Acids** — Solid; MP 200. Fat antioxidant. Water sol.

539) **3-Methylnorcamphane-2-Methanol** — Liquid; BP 215. Chem int. Readily esterifies with carboxylic acid.

540) **p-Octylphenyl Salicylate (Inhibitor OPS)** — Solid; MP 72-74. UV stabilizer for polyolefins. Good compatibility.

541) **Resorcinol Monobenzoate (Inhibitor RMB)** — Solid; MP 132-135; BP 140 @ 0.15 mm. UV light inhibitor in cellulosics. Does not impart color.

542) **Sodium Gentisate** — Solid; MP 220. Fat antioxidant. Water soluble.

543) **2,2,4,4-Tetramethyl-1,3-Cyclobutanediol** — Solid; MP 125-135. Chem int; derivatives show thermal and hydrolytic stability.

544) **Tetramethyl-1,3-Cyclobutanedione** — Solid; MP 115-116. Photo dye int.

545) **2,4,5-Trihydroxybutyrophenone (Inhibitor THBP)** — Solid; MP 149-153. Polyolefin antioxidant. Excellent compat; nonvolatile.

546) **2,2,4-Trimethyl-1,3-Pentanediol** — Solid; MP 49-51; BP 109-111 @ 4 mm. Int for lub additives; insect repellent formulations; alkyl resins.

547) **2,2,4-Trimethylpentanediol Monoisobutyrate** — Liquid; BP 180-182 @ 125 mm. Terminating alcohol in polyester prep; Plasticizer int; detergent int. Hindered secondary hydroxyl.

548) **Vinyl Isobutyl Ether** — Liquid; BP 82.9-83.2. Int for adhesives, coatings, casting compounds. Typical vinyl reactions.

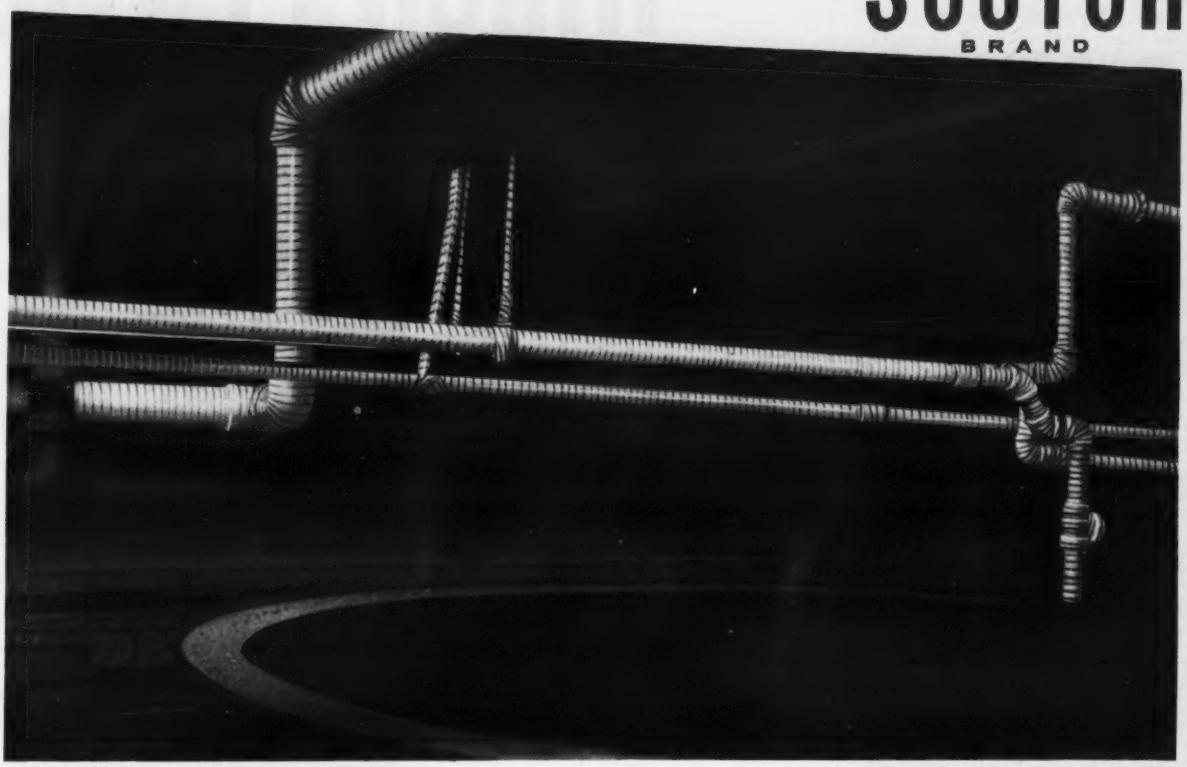
Maumee Chemical Company, 1310 Expressway Drive, Toledo 8, Ohio

549) **Inhibitor 98** — MP −30. Inhibits corrosive action of sulfamic, sulfuric, phosphoric acid and sodium bisulfate on metals.

550) **4-Nitro-3-trifluoromethyl Phenol** — Purity 70%. Selective lamprecide, bactericide, fungicide.

For more information on product at left, specify 3225 . . . see information request blank opposite last page.

SCOTCH BRAND



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PLASTIC TAPE GIVES PIPES ANTI-CORROSION PROTECTION

Now you can stop pipe network corrosion before it starts . . . fast, too, with wrappings of pressure-sensitive "SCOTCH" BRAND Plastic Tapes. Tape provides an air-tight moisture-vapor barrier that guards against corrosion or deterioration from acid laden fumes; is also resistant to oil, water, caustics, greases, and most commercial solvents.

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Check 3226 opposite last page.

551) o-Trifluoromethyl Aniline — Purity 95% min; BP 68 @ 15 mm. Int for pharmaceutical, agricultural chemicals.

552) m-Trifluoromethyl Aniline — Purity 99-100%; BP 187-8. Pharmaceutical int. High isomer purity.

Pennsylvania Refining Company, Butler, Pa.

553) Polyethylene Glycol Oleate-Linoleate (Peglo 9, 12, 15) — Liquid emulsifiers light in color and thermally stable.

West Virginia Pulp and Paper Company, Polychemicals Department, Charleston A, South Carolina.

554) Alkali Lignin Polymer, Chemically Modified (BR-37) — Powder plasticizer and strengthener for structural clay products. Low cost; stable.

555) Lignin Amine (Indulin XW-1) — Powder corr inhib. Sol in acidic, alkali systems; insol at neutral pH.

556) Phenolic Polyether (ER-47) — Powder; modified lignin. Reacting extender for epoxy. Chemically combines with both epoxies and anhydride curing agents.

557) Refined Lignin Polymer (PC-31) — Powder. Phenolic coreactant. Consistently crosslinked by methylolated phenols.

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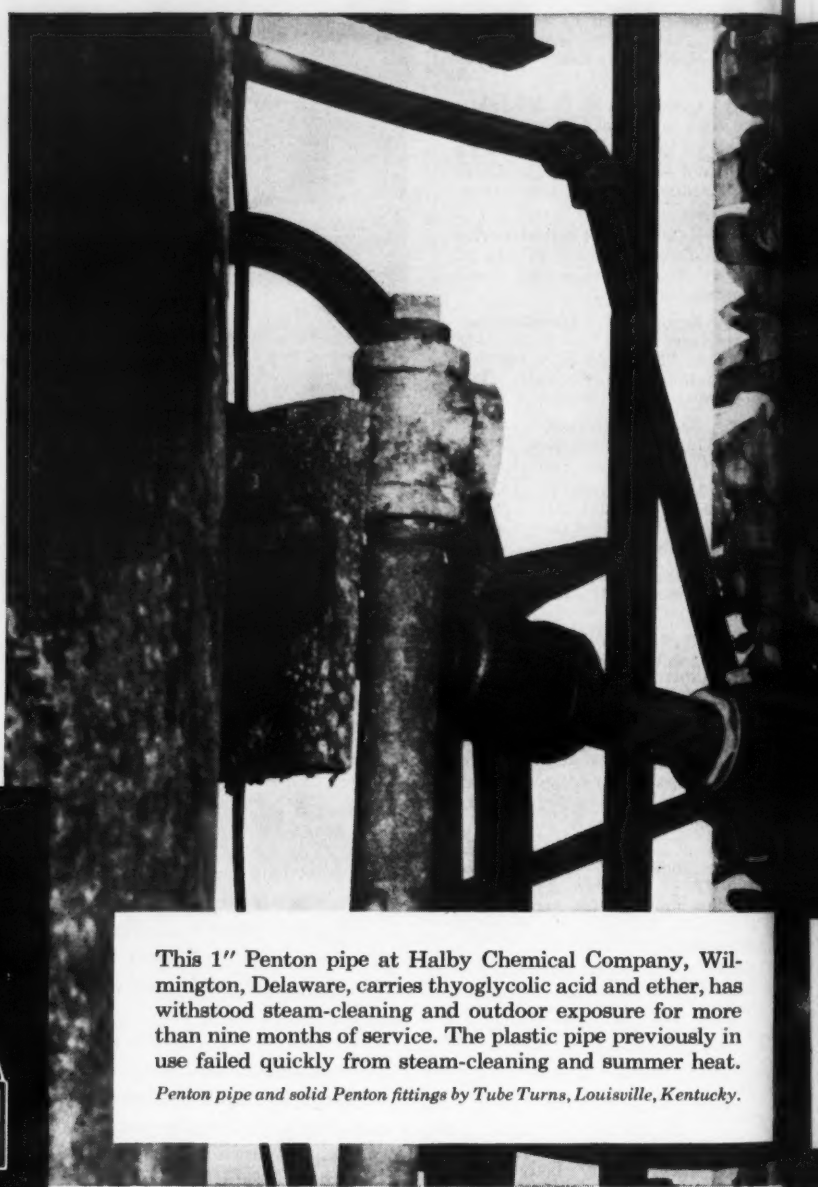
WHICH PENTON* PIPE

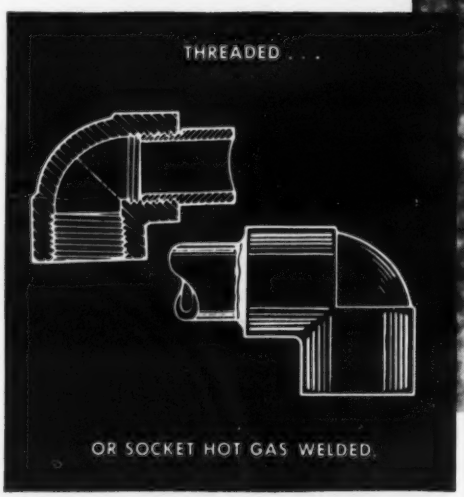
SOLID PENTON PIPE:

A rigid, uniform pipe produced by extrusion, and available in sizes from ½" to 2" in either Schedule 40 or Schedule 80, in lengths up to 20 feet. Use in conjunction with injection molded, solid Penton fittings with socket or threaded connections (see diagram below). Provides both interior and exterior high temperature corrosion control. Today's most versatile, all-plastic pipe.



This 1" Penton pipe at Halby Chemical Company, Wilmington, Delaware, carries thyoglycolic acid and ether, has withstood steam-cleaning and outdoor exposure for more than nine months of service. The plastic pipe previously in use failed quickly from steam-cleaning and summer heat.

Penton pipe and solid Penton fittings by Tube Turns, Louisville, Kentucky.



COMPLETE CORROSION CONTROL

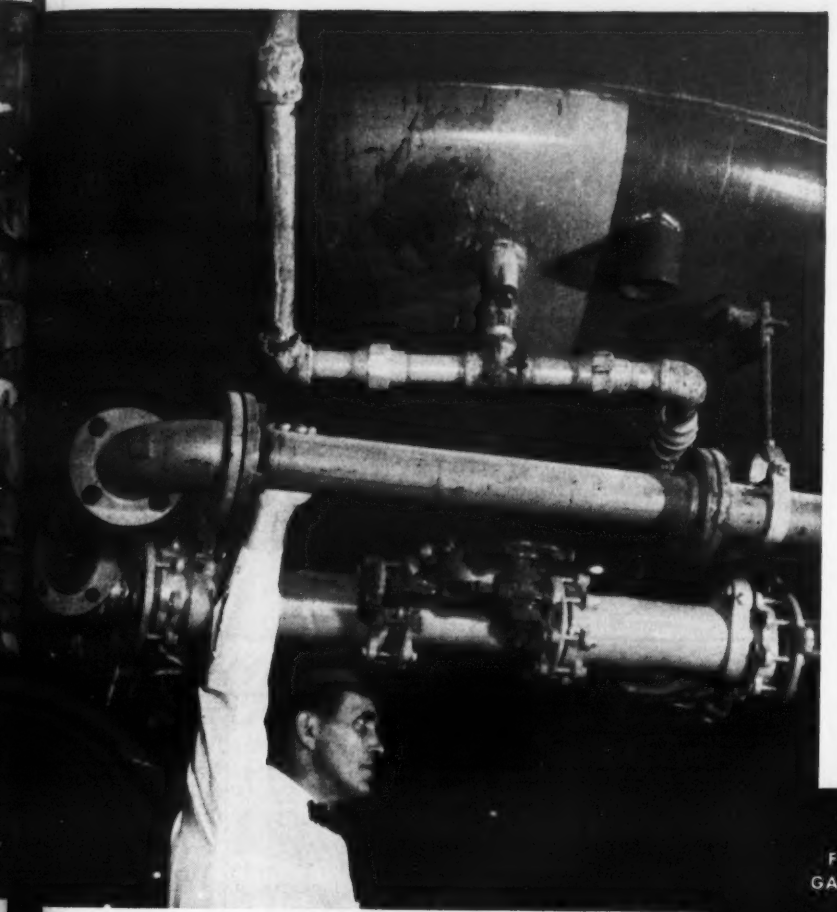
Inside and outside

High temperature resistance to a broad range of chemical reagents
Easily fabricated
Resistant to chemical atmospheres

Penton pipe and fittings, used in combination with other readily available Penton components for chemical processing, now make it possible to design a complete anti-corrosion system based on this versatile high temperature thermoplastic. Write for your copy of "The ABC's of Penton for Corrosion Resistance," which rates Penton's performance when ex-

**Hercules trademark for chlorinated polyether*

IS BEST FOR YOU?

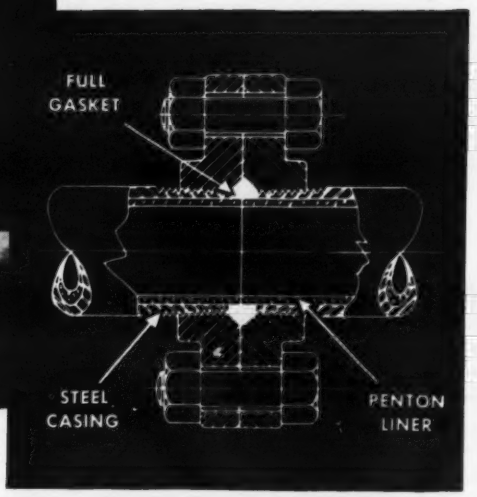


This 3" Penton-lined pipe carries a chlorinated product in carbon tetrachloride, 0.1% to 3% hydrogen chloride, less than 0.1% chlorine, and occasional saturation with water, at temperatures ranging from 165°F. to 185°F. It shows no change after more than 10 months in continuous use.

Penton-lined pipe by Saran Lined Pipe Company, Ferndale, Michigan.

LINED PENTON PIPE:

Steel pipe with a heavy Penton lining, available in sizes from 1" to 6" I.P.S. outside diameter, in lengths up to 10 feet. Joined by flanged gasket connection (see diagram below), it can be cut and fitted in the field without difficulty. Combines the outstanding high temperature, corrosion resistance of Penton with the structural strength of steel.



posed to over 280 different chemicals and chemical reagents. Complete information on current sources for Penton products is listed in "The Penton Buyer's Guide," also available upon request.

Cellulose Products Department

HERCULES POWDER COMPANY
INCORPORATED

Wilmington 99, Delaware

THE STRENGTH OF STEEL

and the properties of Penton

Excellent corrosion resistance at elevated temperatures
Economically installed
Safe, durable, and strong

CP60-8

Check 3227 opposite last page.

NEW LITERATURE

Chemical Materials

Ester-based lubricant designed primarily for use in gas-turbine aircraft is discussed in TDR N-108—Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company.

Check 3228 opposite last page.

Plasticizers for giving improved film formation, better tack, faster drying, flexibility and gloss to synthetic resin adhesives are delineated in Plasticizers Bul—Organic Chemicals Division, Monsanto Chemical Company.

Check 3229 opposite last page.

Some 200 chemicals, available in sample quantities, are compiled along with formulas and typical properties in 40-page Dow 1960 Cat—Technical Service and Development Department, Dow Chemical Company.

Check 3230 opposite last page.

Petroleum waxes and microcrystalline waxes, in particular, are given comprehensive treatment in Waxes Bul—Sonneborn Chemical and Refining Corporation.

Check 3231 opposite last page.

Plastic products of Teflon, Raylon and Kel-F are described and illustrated in 36-page catalog. Mechanical and electrical properties of products with graphs helpful to engineers in incorporating them into their finished products are covered. Plastic Products cat—Plastic Products Division, Raybestos-Manhattan, Inc.

Check 3232 opposite last page.

Chlorinated cyanuric acids and salts are detailed in 44-page technical bulletin which describes physical, chemical and functional properties of products and presents performance information. Bul I-177 — Inorganic Chemicals Division, Monsanto Chemical Company.

Check 3233 opposite last page.

Water soluble packages of a phenylmercuric additive used as mildewside-preservative in paint industry are explained in four-page Metasol 57 Bul—Metalsalts Corporation.

Check 3234 opposite last page.

Montmorillonite catalysts, K-Series, are discussed in two-page technical data sheet which includes advantages, chemical composition and reaction examples. Bul K-11960—Chemical Products Division, Chemetron Corp.

Check 3235 opposite last page.

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for washing, cooling, processing, humidifying, dehydrating and hundreds of other applications.

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CHEMICAL MATERIALS

Ketones as solvents in chemical intermediates are treated in 48-page booklet giving data on 15 ketones and diketones commercially available. Information on applications, coatings, formulations, physicial properties and physiological properties are given. Bul F4767E — Union Carbide Chemical Company, Division of Union Carbide Corporation.

Check 3237 opposite last page.

Liquid desiccant, Hi-Dry, a special grade of tetraethylene glycol is subject of technical bulletin—Jefferson Chemical Company, Inc.

Check 3238 opposite last page.

Polymer directory and catalog of 12-pages contains properties, end uses and other technical data for more than 150 products. The Polymer Directory and Catalog—Department H, The Borden Chemical Company, Division of The Borden Company.

Check 3239 opposite last page.

Baking enamels are subject of two-page technical data sheet. Data presented includes physical characteristics, coverage, available finishes and test results. Data sheet No. 305—The Stanley Chemical Company, subsidiary of The Stanley Works.

Check 3240 opposite last page.

Viscosity stabilization of corrugating adhesives is subject of technical data sheet which discusses use of a colloidal attapulgite additive. A typical stabilized adhesive formulation is given. Bul T. I. 309—Minerals & Chemicals Corporation of America.

Check 3241 opposite last page.

Guide to silicones and their uses is contained in 16-page brochure. Products reviewed range from adhesives to release agents and water repellents. Data on forms, properties and applications are included. "Engineering Guide"—Dow Corning Corporation.

Check 3242 opposite last page.

Thorium, scandium and yttrium's potential uses, properties and chemical analysis are but part of information contained in eight-page brochure covering these rare earth group elements. Rare Earth Elements Bul—Vitro Corporation of America.

Check 3243 opposite last page.

Insulating resins and their uses in electrical applications are presented in easy-to-read guide titled "Maraset Electrical Resins Selector"—Marblette Corporation.

Check 3244 opposite last page.

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For CARBON DIOXIDE

BULK LIQUID

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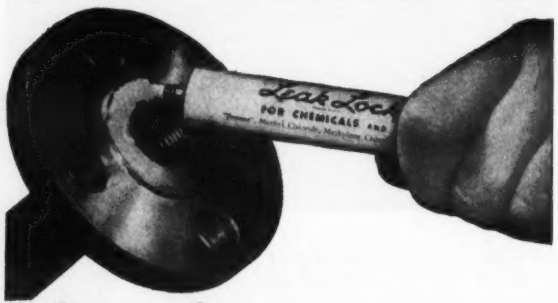

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Here's a simple, economical solution to many troublesome leaking joint problems. Leak Lock holds LP, gasoline, oils, gases, petro-chemicals and refrigerants that eat through ordinary joint compounds. It's remarkably tough, highly adhesive, remains flexible indefinitely . . . the joint compound that stretches rather than breaks. Years of use have established its advantages in stopping wasteful or hazardous leaks in the petroleum, chemical, atomic energy, electronic, refrigeration and other fields.

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Check 3246 opposite last page.

chemical processing

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- QUALITY READERSHIP
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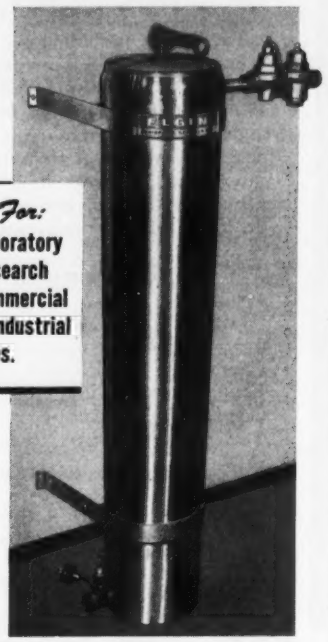

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Exactly fills the bill for those whose needs are too small for a full size deionizer, and too large for small laboratory apparatus. It alone offers:—

High output; low cost—Delivers up to 120 GPH of deionized water, chemically purer than distilled water. Does it at a fraction of distillation cost.

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No regeneration—We do it for you! Ion exchange material is in easily handled bags; extra bags supplied with the unit. When material is spent, simply replace with fresh bags which come right with the unit. Then return spent bags to us for prompt regeneration. You always have a supply on hand. No back-washing, no acids or alkalis to handle, no trained operator needed. No expensive throw away cartridges. Nothing to get out of order.

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180 N. Grove Ave., Elgin, Illinois
Representatives in Principal Cities
In Canada: G. F. Sterne & Sons, Ltd., Brantford

Check 3247 opposite last page.

Industrial products folder contains information on over 125 chemicals available on production or development scales. Also included is a six-page brochure explaining facilities for custom chemical synthesis. "Chemicals For Industry"—Elanco Products, Inc., Division Eli Lilly and Company.

Check 3248 opposite last page.

Dodecenyl succinic anhydride's suggested uses are featured in 29-page technical booklet which includes physical and chemical properties. Bul I-8R—National Aniline Div., Allied Chemical Corporation.

Check 3249 opposite last page.

Thioacetamide bulletin includes annotated bibliography citing over 75 references, in 10 pages. Dept. EH, J. T. Baker Chemical Company.

Check 3250 opposite last page.

Epoxidation

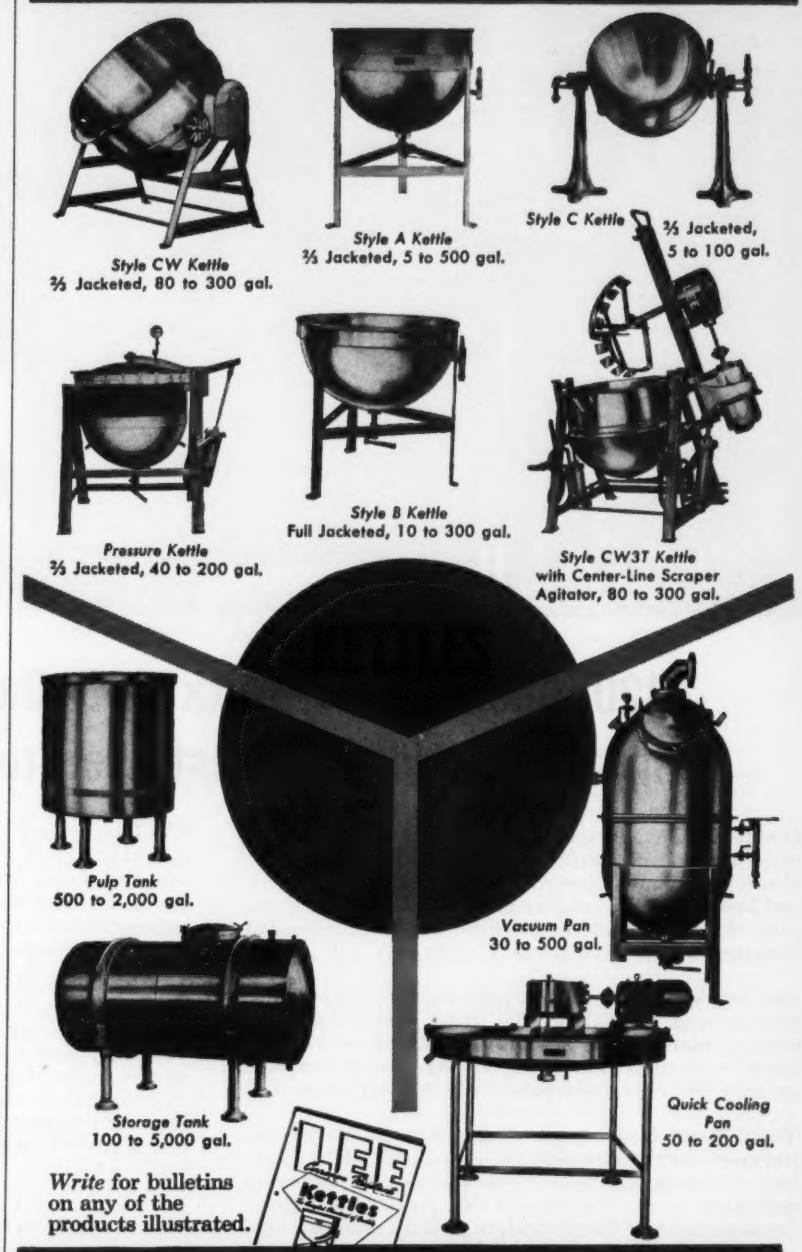
From page 29

and economics. Today, the HOAc-H_2SO_4 process competes favorably with the HOAc-resin processes for monounsaturates, such as butyl oleate. For the polyunsaturates, such as soybean oil, the resin systems give higher epoxy yields.

Future

In the meantime another direct epoxidation process (6), which uses a solution of peracetic acid formed from acetaldehyde, has come into commercial importance, but is not yet available for licensing. Union Carbide Chemicals Co. uses the process for their own epoxidation activities. A peracetic acid preparation process (7) involves oxidation of acetaldehyde by air to acetaldehydemonoperacetate. Of key importance is the quick splitting (by pyrolysis) of this compound to peracetic acid, and its quick separation from acetaldehyde to prevent the latter's peroxidation. This step employs a solvent, and the peracetic acid solution so formed is used directly for epoxidizing unsaturated fats,

LEE PRODUCTS
For Reduced Processing Costs


Style CW Kettle
⅔ Jacketed, 80 to 300 gal.
Style A Kettle
⅔ Jacketed, 5 to 500 gal.
Style C Kettle
⅔ Jacketed, 5 to 100 gal.
Pressure Kettle
⅔ Jacketed, 40 to 200 gal.
Style B Kettle
Full Jacketed, 10 to 300 gal.
Style CW3T Kettle
with Center-Line Scraper Agitator, 80 to 300 gal.
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Write for bulletins on any of the products illustrated.

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Kettles, Plain and Jacketed	Tanks, Processing and Storage	Agitators and Accessories	Vacuum and Pressure Equipment

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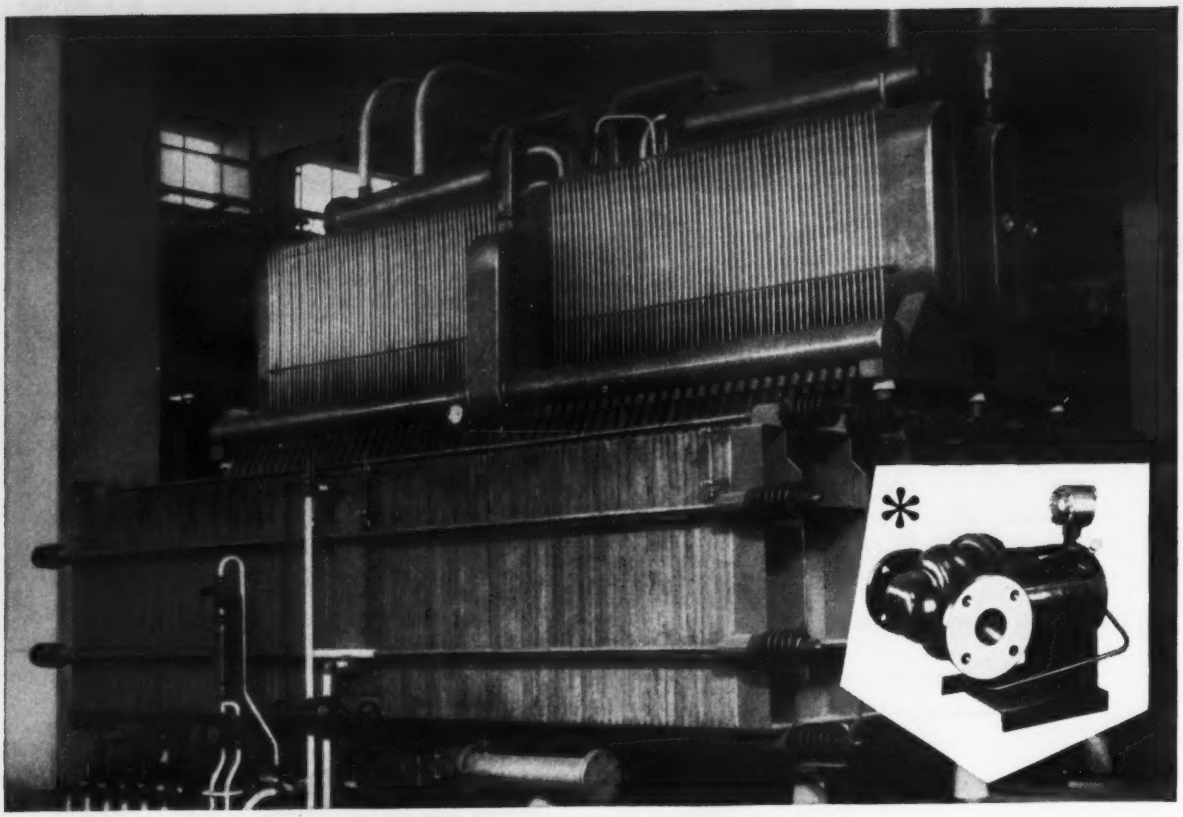

120 Chempumps Work 365 Days a Year In the World's Largest Electrolysis Plant

Leakproof Chempumps are eliminating pump maintenance worries and downtime at the world's largest water electrolysis plant, operated by Hindustan Chemicals and Fertilizers, Ltd., at Nangal, India. Enormous quantities of hydrogen are produced for use in much-needed fertilizers for Indian farmers.

One hundred and twenty double-suction Chempumps provide long, satisfactory life under conditions of infrequent maintenance—a vitally important contribution since the plant produces 800,000 cubic feet of hydrogen an hour and operates continuously 365 days a year.

Two Chempumps in each of the sixty 24′ x 18′ electrolyzers circulate the electrolyte, a 25-30% KOH solution, to the bipolar cells. These pumps combine motor and pump in one sealless unit that prevents leakage or contamination of the electrolyte through elimination of conventional seals and stuffing boxes . . . and assures a continuous, pure supply of electrolyte to the cells.

The Hindustan Chempumps have a capacity of 90-100 gpm at a 3′ head. Extremely small in size, they fit easily into the piping arrangements of the compact electrolyzers. Entirely maintenance-free with the exception of occasional bearing checks, they save "considerable time and money" at the Nangal plant.

* High-capacity, low-head Chempumps, using double-suction casings and impellers, were designed and built especially for this installation. Hydraulic balance, plus extremely low motor loading, assures uninterrupted operation for Hindustan, particularly important where maintenance is necessarily infrequent. By eliminating seals and stuffing boxes, Chempump "canned" pumps eliminate 90% of pump problems for processors throughout the world.

To learn what Chempump can do for you, write for COMPOSITE BULLETIN 1100. Chempump Division, Fostoria Corporation, Buck and County Line Roads, Huntingdon Valley, Pennsylvania.

First in the field . . . process proved

CHEMPUMP®

Check 3252 opposite last page.

Epoxidation

From preceding page

fatty acid esters, and vegetable oils.

The epoxy industry is a big user of H_2O_2. It is expected that this will continue to grow as more applications are found and as epoxidation can be done at lower cost. It will be interesting to see how the acetaldehyde-approach-system fits into this over-all pattern.

For More Information

(Oxiron epoxy resins are a product of Epoxy Dept., Chemicals & Plastics Div., Food Machinery and Chemical Corp., 161 E. 42nd St., New York, New York.)

Check 3253 opposite last page.

(Epichlorohydrin is a product of Shell Chemical Corp., 380 Madison Ave., New York 17, N. Y.; The Dow Chemical Company, Midland, Mich.; and Union Carbide Chemicals Company, Div. of Union Carbide Corporation, 30 E. 42nd St., New York 17, N. Y.)

Check 3254 opposite last page.

(Bisphenol-A is made by Organic Chemicals Div., Monsanto Chemical Co., Lindbergh & Olive St. Rd., St. Louis, Mo.; Dow Chemical; and Union Carbide Plastics Company, Div. of Union Carbide Corporation, 420 Lexington Ave., New York 17, N. Y.)

Check 3255 opposite last page.

("Protected resin" and "expendable resin" processes for in-situ epoxidation with H_2O_2 and ion exchange resin catalyst are licensed by Food Machinery and Chemical Corp.)

Check 3256 opposite last page.

(Cation exchange resin catalysts for in-situ epoxidation—sulfonated copolymers of styrene with divinyl benzene—are products of Dow Chemical; Pfaudler-Permutit Co., 50 W. 44th St., New York 36, N.Y.; Rohm & Haas Company, 222 W. Washington Sq., Philadelphia 5, Pa.; and Chemical Process Co., PO Box 829, Redwood City, Calif.)

Check 3257 opposite last page.

Rapid CPI Expansion Spurs Instrument-industry Growth

WILLIAM R. WHITE, Market Analyst
Hornblower & Weeks

The outstanding growth achieved in recent years by the chemical industry has been a major factor in an upsurge in the instrumentation industry. Research expenditures in this area now run into hundreds of millions of dollars annually.

Rising demand for instruments has given impetus to formation of specialized manufacturers. Among better-known concerns which have turned to this lucrative field are Bausch & Lomb Optical, Beckman Instruments, Cenco Instruments, Daystrom, Harris-Intertype and Hewlett-Packard.

Bausch & Lomb, as a leading manufacturer of lenses and optical glass, supplies ophthalmic products and scientific optical instruments to laboratories and industrial-research groups. A newly developed line of stereo-microscopes is reportedly gaining wide acceptance. An electron-microscope X-ray analyzer for use in metallurgical-research projects is expected to contribute importantly to volume.

Sales have almost doubled in the last decade, rising to $63 million in 1959 from $53 million a year earlier. Net profit increased to $2.65 a share from $1.77 in 1958. Net profit this year has shown a continuation of the 1959 uptrend with a rise to 59¢ a share for the March quarter from 54¢ last year, despite an increase in capitalization. Dividends were raised in the first quarter to $1.20 from the $1.00 per share annual rate being paid before that time.

Beckman Instruments has experienced phenomenal expansion. They are regarded as a leader in developing precision analytical instruments for military applications as well as for use in industry. This concern (one of its own best customers) devoted almost 8% of last year's sales volume to further research and development of instrumentation Products include potentiometers, spectrophotometers, infrared gas and oxygen analyzers, electronic counters and digital recorders.

Sales rose last year to almost $45 million from about $40 million in 1958. Net profit reached a new peak at the equivalent of $1.30 a share, which contrasted with a deficit of slightly less than $1 million in 1958. Earnings have shown a vigorous uptrend this year. Net profit rose in the March quarter to 83¢ a share from 31¢ a year earlier. No dividends have been paid since 1950.

Harris-Intertype represents a consolidation of two leading producers of equipment used in the publication and printing industries. They have been concentrating recently on development of instruments used in microwave research and in communications. Thus far, this activity represents a relatively small portion of total volume. Sales came up to $64 million last year from $58 million in 1958. Net profit of $2.53 per share in 1957 climbed to $3.90 last year. Results for the fiscal year ended June 30 are estimated to have approached the 1956 high of $4.40 a share. Dividends are being paid at the rate of $1.50 annually.

(For further information on chemical stocks write Hornblower & Weeks, 40 Wall St., New York 5, N.Y.)

Check 3258 opposite last page.

DORR-OLIVER
ODS PUMPS
PAY OFF *in hydraulic transfer*
of Granular Carbon

At Refined Syrups & Sugars, Inc., Yonkers, N. Y., two rubber-lined 3" ODS Slurry Pumps, in split-flow, parallel arrangement, are the heart of a hydraulic handling system for granular carbon used as a decolorizing agent. They pump 25 to 30 GPM of a heavy, viscous slurry (1 lb. carbon per gal. 60 Brix syrup) at a velocity of 3 ft. per sec. in a vertical lift of 100 ft.

ODS Diaphragm-Type Pumps operate without mechanical linkage, so there is no stuffing box, no leakage. With no whirling action either, little particle degradation occurs. Installed over 18 months ago to meet an acute dust problem caused by handling carbon mechanically, the system has given complete satisfaction with a minimum of carbon attrition.

The ODS is one of three Dorr-Oliver pump types satisfying all chemical processing needs. For more information, write to Dorr-Oliver Incorporated, Stamford, Connecticut.

ODS—Trademark Dorr-Oliver Incorporated

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Check 3259 opposite last page.

Permaglas® Storage Structures eliminate packaging costs

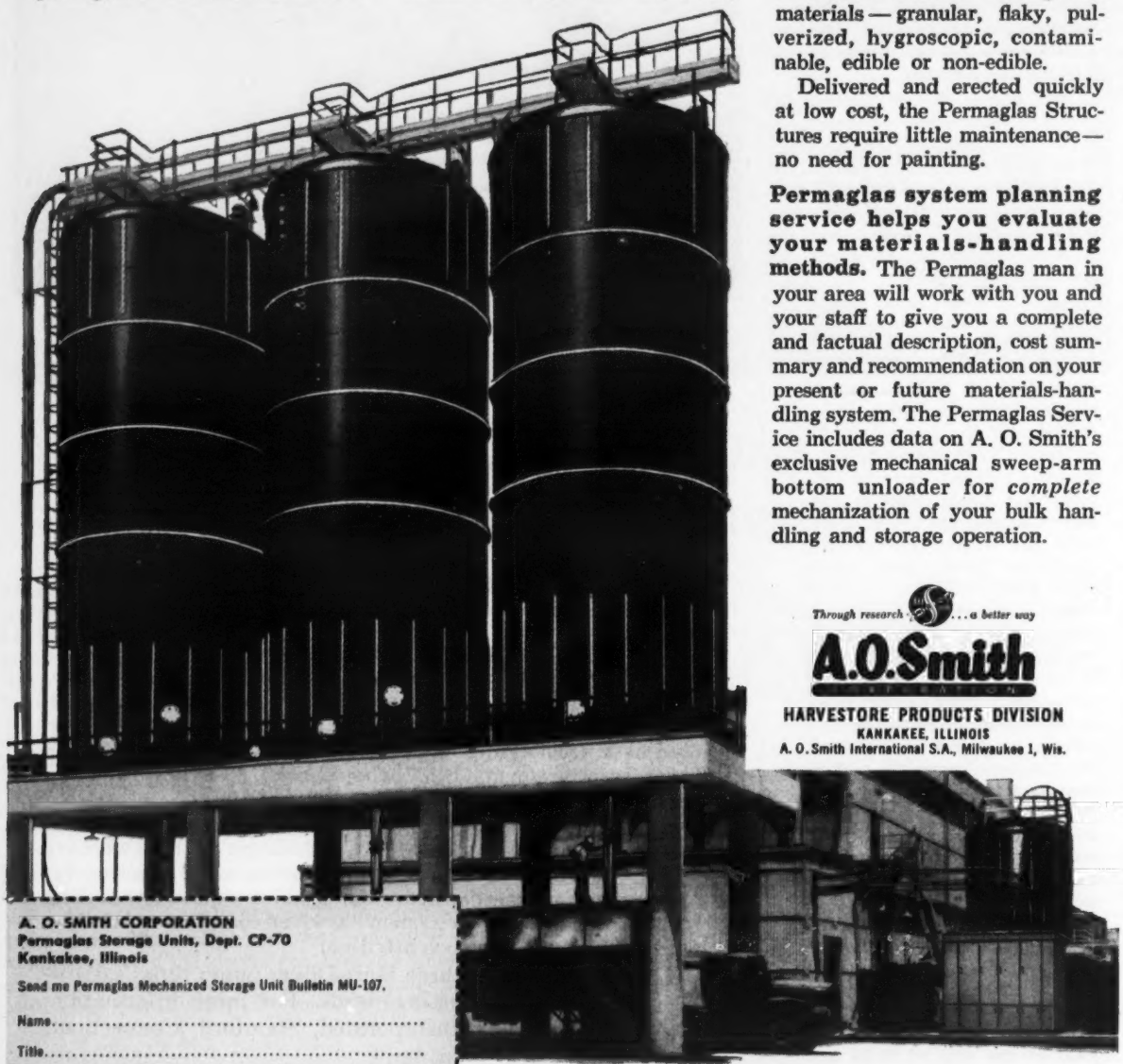
A Texas Corporation maintains contamination-free operation in changing from costly packaging to economical bulk handling.

Towering above the flat Texas Plain at Big Spring—four Permaglas Storage Structures testify to the wisdom of the change from packaged to bulk materials-handling and storage.

Specified by Blaw-Knox engineers, materials-handling consultants for a wide variety of industries such as foodstuffs, chemicals, feed ingredients, rubber, plastics and pharmaceuticals — the Permaglas Structures met all requirements. These steel structures — glass-protected inside and out safeguard products from contamination and discoloration ... and are ideal for storing bulk materials — granular, flaky, pulverized, hygroscopic, contaminable, edible or non-edible.

Delivered and erected quickly at low cost, the Permaglas Structures require little maintenance—no need for painting.

Permaglas system planning service helps you evaluate your materials-handling methods. The Permaglas man in your area will work with you and your staff to give you a complete and factual description, cost summary and recommendation on your present or future materials-handling system. The Permaglas Service includes data on A. O. Smith's exclusive mechanical sweep-arm bottom unloader for *complete* mechanization of your bulk handling and storage operation.



Through research ... a better way

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Cosden Petroleum Corporation's three 20' x 50' Permaglas Bulk Storage Structures are loaded by pneumatic conveyor. They discharge ⅛" cube polystyrene molding pellets by gravity into bulk transfer trucks below. A fourth 14' x 15' Permaglas Structure safely stores crumb rubber.

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Send me Permaglas Mechanized Storage Unit Bulletin MU-107.

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City.....Zone....State.....

Check 3260 opposite last page.

Industrial Hygiene

From page 35

2) **Review process specifications, new materials and equipment on a continuing basis.** Solve environmental health problems at the design or formative stages rather than allowing the problems to develop at the operating stages. The dollars and cents savings of incorporating control in the original design are obvious.

Industrial-hygiene Pioneer

Much of the background information for this article was obtained in an interview with George M. Wilkening, who is an industrial hygienist with Esso Standard Division of Humble Oil & Refining Company in Linden, New Jersey. Naturally, the opinions expressed in the story are those of the author and not of Mr. Wilkening.

Esso Standard is a leader in the field of industrial hygiene. Their program was begun in 1948. It incorporates such items as reviews of blueprints, periodic surveys of health conditions, investigation of special health conditions, investigation of special health problems, development of methods of measurement and control of health hazards, correlation of environmental with clinical findings, and use of hygiene committees for communications and health-education purposes.

3) **Make periodic comprehensive assessments of work environments to determine the effectiveness of control measures.** This includes the quantitative measurement of concentration or intensity of toxic gases, vapors, fumes, noise, heat, and ultraviolet, infrared and ionizing radiations. Comparisons are then made with acceptable levels of exposure (e.g. Threshold Limit, Damage Risk Criterion, Maximum Permissible Concentration).
4) **If new or special problems are encountered, provision must be made for their detailed study and solution.**
5) **Coordinate and communicate industrial-hygiene findings through proper levels of management.**
6) **Correlate industrial-hy-**

giene findings in the physical environment with clinical observations. From this relationship one can determine whether or not the permissible exposure levels are realistic.

7) **Provide educational material on the control of occupational health hazards.** In this regard, if one is not already familiar with the benefits of industrial associate membership in the American Industrial Hygiene Association, it would be well to investigate them. For an annual fee of $50.00 the company is provided with up-to-date information on the toxicity of various chemicals and means for their control.

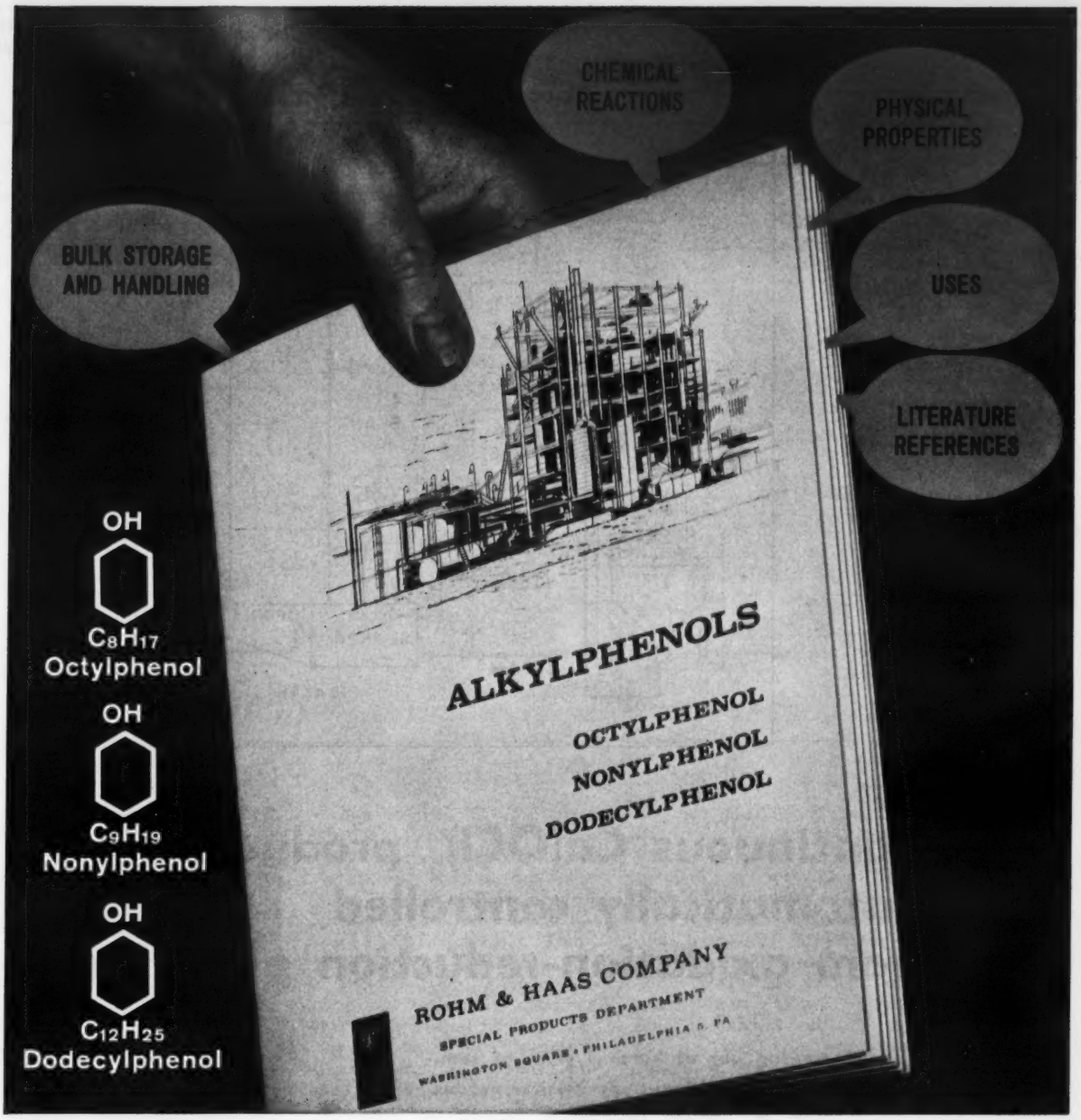
A small chemical plant may find that its operations are not of sufficient magnitude to justify the hiring of a full-time hygienist. In this case, retaining an industrial-hygiene consultant on a part-time basis may be sufficient. Also, many insurance companies provide hygiene services to their insured chemical plants.

Cooperation of Personnel Is Essential

Obviously, the most elaborate and well-planned program of industrial hygiene will fall flat on its face without the full cooperation of the personnel being protected. The key to obtaining such cooperation is education. When employees understand that cooperation is not only in the company's but also in their own interests, their enthusiasm will be quite natural.

"Yup, Yardley finally compounded a universal solvent."

Richard W. Matton
Hamilton Standard Div., U.A.C.



Get this useful information on Alkylphenols

Here is a booklet that will help you in working with alkylphenols. It was designed to aid technical men doing either research, development, or production work. The contents include not only a description of many useful reactions, but also recommendations for handling and storing production quantities of these versatile, low-cost intermediates.

Write to Dept. SP-13 for your copy of this 16-page booklet. Sample quantities of alkylphenols are also available.

Chemicals for Industry

ROHM & HAAS COMPANY

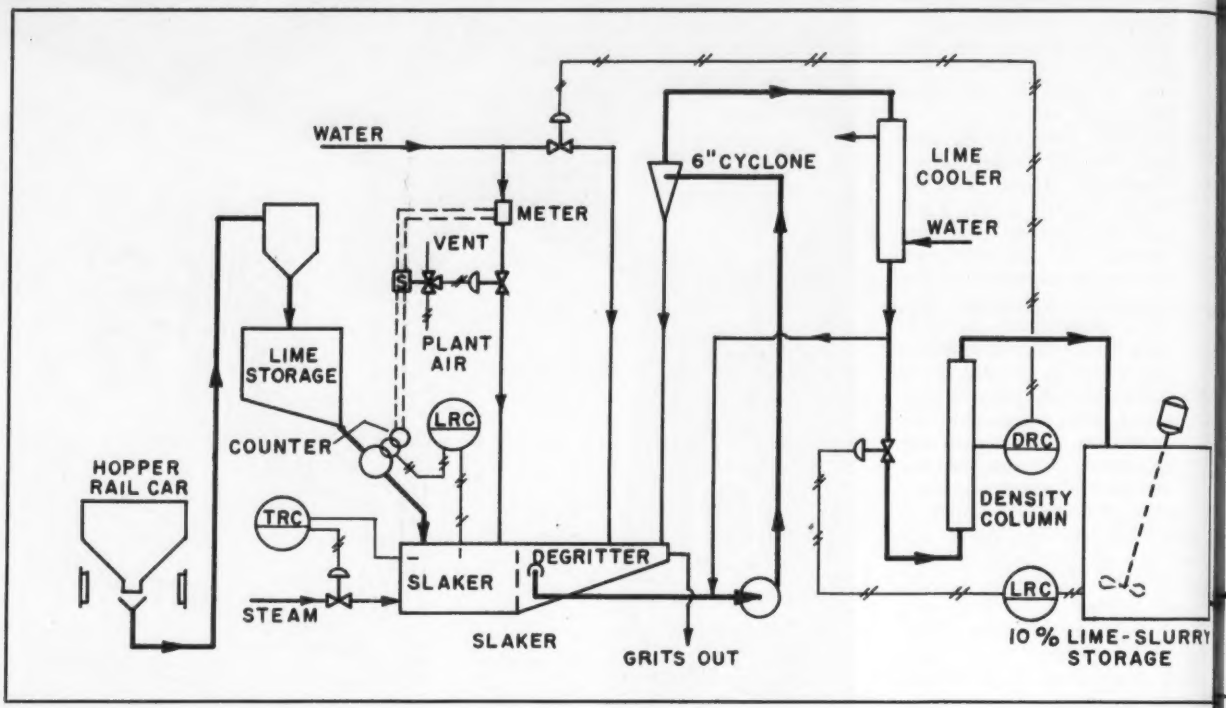
WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Check 3261 opposite last page.

Continuous Calcium-hypochlorite Bleach-liquor Process

KEY

TRC — Temperature Recorder-controller
LRC — Level Recorder-controller
DRC — Density Recorder-controller
LC — Level Controller
PRC — Pressure Recorder-controller
ORRC — Oxidation-reduction Recorder-controller
FR — Flow Recorder



A First —

Continuous $Ca(OCl)_2$ production automatically controlled from oxidation-reduction potential

Bowing out of batch system of semi-clarified calcium-hypochlorite production at Crown Zellerbach ushers in three-way economy of space, labor and materials . . . plus improved product stability and uniformity

E. PAUL DUNCAN and **PHILIP M. SCHNABEL**
Technical Service Supervisor, Western Chemical Division, Hooker Chemical Corporation, Tacoma, Wash.
Woodmill and Pulpmill Superintendent, St. Helens Division, Crown Zellerbach Corporation, St. Helens, Ore.

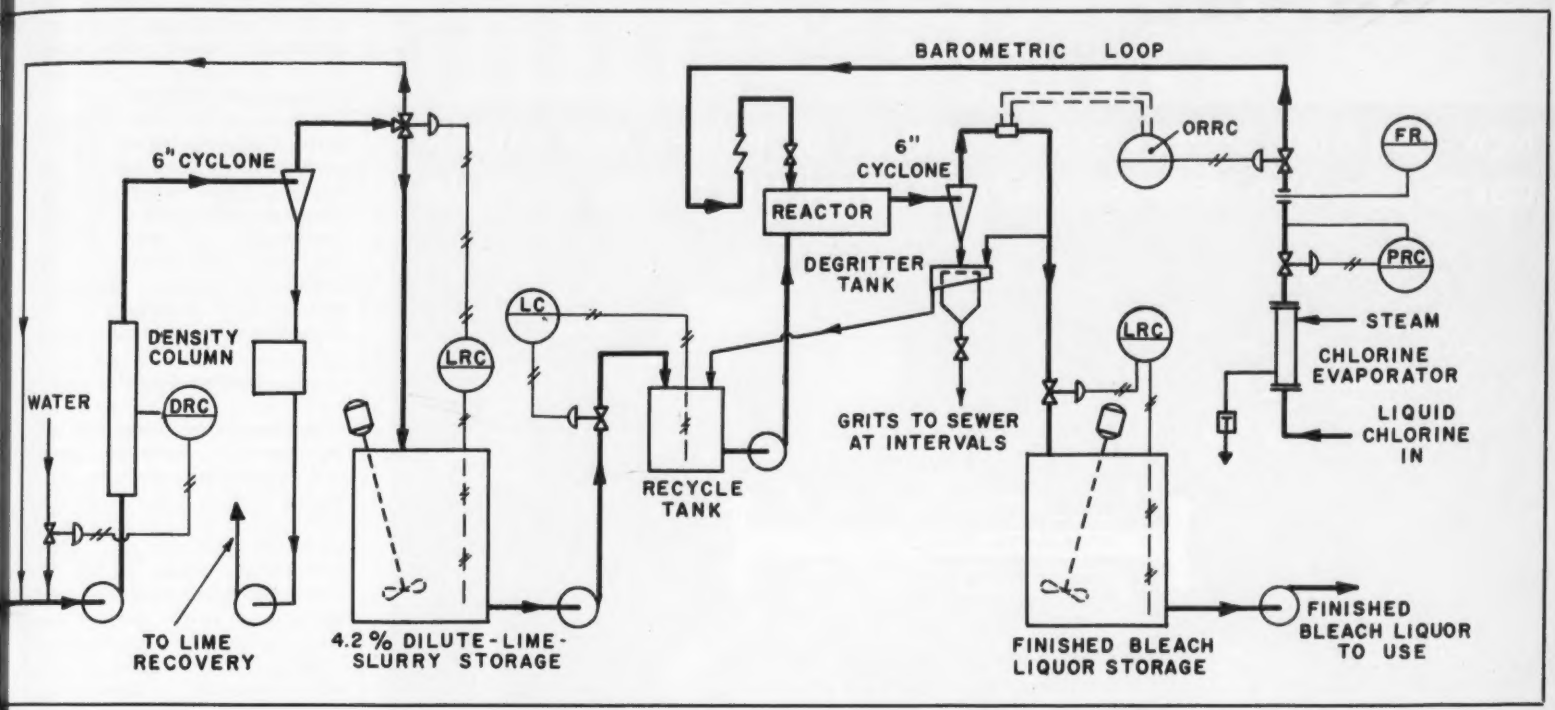
The first continuous, completely automatic semi-clarified calcium-hypochlorite production system utilizing oxidation-reduction-potential control of reaction is in successful operation at St. Helens Division of Crown Zellerbach Corporation in St. Helens, Oregon.

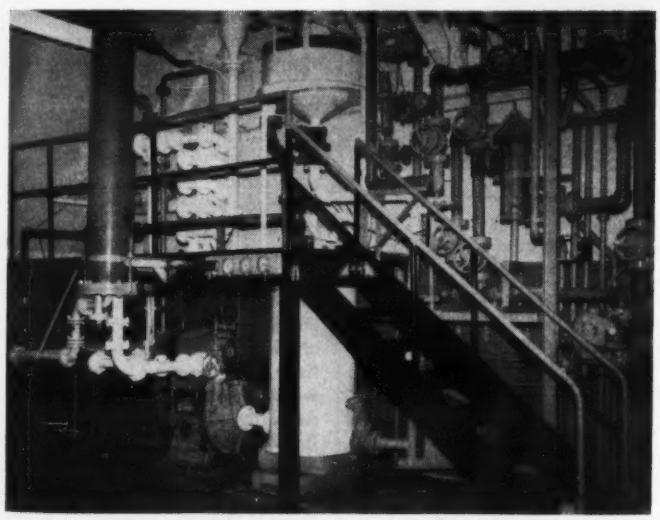
When existing batch equipment became too small for increased production, installation of continuous system was decided upon. Utilization of this process has resulted in savings in space and labor. Stability and uniformity of bleach liquor have also been improved. Finally, complete utilization of chlorine and lime has been attained. Chemical losses of some 2 to 3% were inherent part of the batch system previously used.

System Capabilities

System is capable of producing up to 150,000 gpd of bleach liquor at strength of 40 grams/liter available chlorine, with excess calcium hydroxide at 0.7 grams/liter. Bleach-liquor strength can be controlled at any desired level between 20 and 50 grams/liter available chlorine. Product contains about 0.3% by weight inert solids. These solids are less than 40μ in diam. They have had no adverse effect on pulp quality.

Production rates are varied between 20 and 100 gpm to meet bleach requirements of





Chlorination section of semi-clarified calcium-hypochlorite bleach-liquor production facilities. Process is first continuous one of its kind to utilize oxidation-reduction-potential control of reaction

various pulp grades produced. Average production rate is roughly 67,000 gpd. This requires use of approximately 4000 tons/yr of chlorine and 3600 tons/yr of quicklime.

Process Flow

Calcium oxide is continuously slaked at 190°F in water-to-lime ratio of 6:1. Slaked lime is classified at solids content of 10%. Ten-percent slurry overflowing from rake classifier is pumped to six-inch cyclone for additional classification. It is then passed through shell-and-tube heat exchanger. Here, slurry is cooled to 90°F.

Rejects from cyclone are returned to rake classifier where additional slaking may take place. Slaker operation is completely automatic. Lime and water are automatically adjusted by ratio controller. Feed rates to slaker are controlled by level controller. Dilution-water flow to classifier section is controlled by a density controller on 10% slurry entering 1000-gal 10% slurry storage tank.

Lime slurry is continuously diluted from 10 to 4.2%. Dilution-water flow is controlled by a second density controller. Mixing of water and 10% slurry is obtained in centrifugal pump which delivers dilute slurry to second six-inch cyclone. Overflow from cyclone goes to 8000-gal storage tank, with flow rate handled by level controller.

Some product from each six-inch cyclone is recycled in order to maintain steady feed flow to cyclones and through heat exchanger. This permits optimum classification and prevents plugging. Rejects from second cyclone — containing unslaked lime, calcium carbonate, silica and other inert grits — are pumped to kraft-mill lime recovery. Here, complete utilization of unslaked lime and calcium carbonate is obtained.

The 8000-gal dilute-slurry storage tank provides necessary blending of 4.2% slurry prior to reaction with chlorine. It also gives sufficient alkali capacity to blow down empty chlorine cars, and for emergency venting of chlorine-handling system. Chlorination at this point does not upset reaction control since oxidation-reduction controller automatically compensates for partial chlorination.

Dilute lime slurry at 75°F is pumped to 500-gal recycle tank. Tank supplies partially chlorinated slurry to either of two specially designed reactors. Chlorine in liquid form from tankcars is first evapo-

VAREC VARELECTRIC

NEW TWO-WIRE SUPERVISORY CONTROL OF PUMPS AND VALVES COSTS LESS AND PERFORMS BETTER THAN MULTI-WIRE SYSTEMS

Series 882 control unit for pump motors provides two-status control, such as "off" and "on."
Series 886 field unit for pump motor control.
SINGLE WIRE
COMMON CONDUCTOR
SINGLE WIRE
Series 883 control unit for valve operators provides for three-position control—"open," "close," and "stop."
Series 887 field unit for valve operator control.

The Varelectric 880 Series provides direct, instantaneous control of pump motors, valve operators and similar electrically-operated equipment, while continuously supervising and indicating the status of the controlled devices. Using only one wire between each field and control unit, *plus a common conductor for many units*, a Varelectric system can cut field wiring costs to as little as 25% to 15% of that of conventional systems—which often require from seven to nine wires between individual units.

VARELECTRIC offers these advantages:

- **ECONOMY:** Saves from 75% to 85% of field wiring costs... uses two wires instead of many.
- **RELIABILITY:** Uses continuous, well-filtered, direct current... no AC or DC pulsating current used.
- **PRECISION:** Uses the bridge circuit concept... inherently detects trouble.
- **FLEXIBILITY:** Modular construction provides for flexibility of application... dustproof case attaches to operator's control panel.
- **BROAD APPLICATION:** Varelectric systems can control any electrically-operated equipment up to three statuses.

For applications in the petroleum and chemical industries, or wherever control is vital, Varelectric furnishes the most modern, economical solution to control problems. For full details, send for Bulletin CP-3708. Write Dept. CP-1141-1.

"Varec" TRADE ® MARK

THE VAPOR RECOVERY SYSTEMS COMPANY
2820 North Alameda Street • Compton, California

Branches and Representatives in Principal Cities.

Check 3262 opposite last page.

rated in steam-heated evaporator to provide chlorine gas at 170°F and 80 psig. It is then intimately mixed with lime slurry in reactor to produce calcium hypochlorite.

Reactor is operated at pressure of 40 psig. Bleach-liquor product flows from reactor to six-inch rubber-lined cyclone where residual lime solids are continuously removed. Product from this cyclone is at 100°F. It contains approximately 0.3% solids of less-than-40μ-diam particle size.

Reaction Control

Semi-clarified product passes through electrode flow cell. Oxidation-reduction potential is there measured with silver-silver chloride and platinum electrode pair. This millivoltage signal is fed to controller which activates automatic valve controlling chlorine-gas flow to reactor.

Some bleach-liquor product is recycled to reactor to maintain constant flow through reactor and cyclone. This assures optimum grit separation, constant mixing conditions in reactor and constant time lag in control circuit at all production rates. Bleach-liquor flow to storage is controlled by level controller in two 6000-gal storage tanks. Dilute-lime-slurry flow to reactor is controlled by level controller on recycle tank.

Inert lime rejects from rubber-lined cyclone flow to 50-gal rubber-lined settling chamber. In chamber, larger lime particles are settled out, while smaller are continuously decanted with usable bleach liquor. Overflow from this settling chamber is recycled to reactor where usable lime solids are eventually consumed. Settled grit is dumped to sewer three time daily.

Reactor, classifier, settling chamber, recycle tank, control valves and control panel are closely coupled. They are located on bleach-plant operating floor. Bleach-plant operator thus can easily start and stop system. System requires little operating attention. Reaction equipment and bleach-liquor handling equip-

ment are constructed of corrosion-resistant Saran-lined steel, rubber-lined steel and PVC.

Scale Formation Problem

Shortly after start-up of system, calcium-carbonate scale formation problem developed in reactor. Maintenance costs were excessive due to frequent descaling required to maintain production rates. Complete redesign of reactors and associated equipment has now eliminated this difficulty. It is still necessary, however, to clean bleach-liquor transfer pipe with acid about once every two months.

(DorrClone cyclones and Dorr Co. slaker-classifier are products of Dorr-Oliver Incorporated, Stamford, Conn.)

Check 3263 opposite last page.

(Density, level, oxidation-reduction and ratio controllers are products of Industrial Division, Minneapolis-Honeywell Regulator Company, Wayne & Windrim Avenues, Philadelphia 44, Pa.)

Check 3264 opposite last page.

(Continuous calcium-hypochlorite bleach-liquor process is licensed by Hooker Chemical Corporation, 666 Fifth Ave., New York, N. Y.)

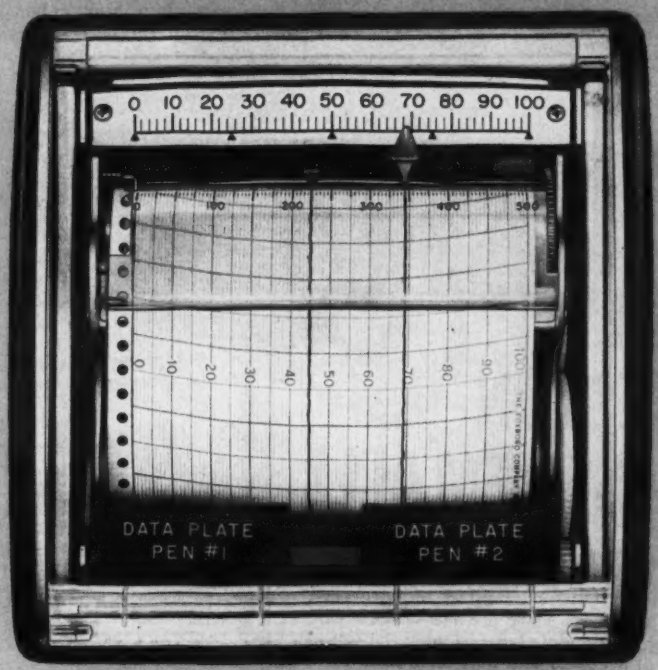
Check 3265 opposite last page.

"Next time we'd better use angles instead of pipe railing."

B. Walsh & F. White, Foster-Wheeler

another unit in
Foxboro's **exclusive** 100% solid-state
electronic Consotrol* system

Simplest most reliable electronic recorder yet!



Foxboro M/64 Electronic Consotrol Recorder

no amplifiers...no electrical adjustments

The precision and speed of electronics...*plus* the simplicity and reliability previously associated only with pneumatics. That's the new Foxboro M/64 electronic Consotrol recorder.

The M/64 uses a powerful magnetic torque motor to operate pens directly from a high-level 10-50 ma d-c signal. There's no amplification necessary—no slidewire or rebalancing unit. 4-inch vertical strip chart gives full-scale readability of records. One and two-pen models available for semi-hazardous or non-hazardous service.

The M/64 slides out of its housing like a drawer, so all servicing may be done from the front of the panel. Yet there is no interruption to recorder operation! What's more, zero, span, and linearity are all simple mechanical adjustments, so familiar to pneumatic instrument users.

Write today for Bulletin 21-10. It describes the new M/64 Recorder in detail, as well as the many other advanced instruments in Foxboro's complete 100% solid-state electronic control system. **The Foxboro Company, 817 Neponset Ave., Foxboro Mass.**

*Reg. U.S. Pat. Off.

FOXBORO
REG. U.S. PAT. OFF.
ELECTRONIC CONSOTROL INSTRUMENTATION / for every function in the control loop

Check 3266 opposite last page.

Of all the features you want in a thermometer

ONLY WESTON HAS THEM ALL!

Weston 4,000 Series Bi-Metal Thermometers are "tailor-made" to include the important features wanted in industrial thermometers. Here are the reasons why these instruments have become the standard of accuracy and long-term reliability:

Guaranteed Accuracy . . . ± 1% of range.

Long Life . . . rugged, all-stainless steel construction— including welds.

Ease of Reading . . . in-line scale and pointers eliminate parallax errors.

Fast, Dependable Thermal Response . . . exclusive Weston multiple-helix sensitive elements.

Maximum protection against "Breathing" and Leakage . . . special gasket material assures extra-tight seal.

Removable Bezels . . . on-the-job glass replacement is simple.

External Adjustment . . . conveniently located on side of cases.

Choice of Type for Every Application . . . 3-inch or 5-inch heads; back and bottom connected models with rotatable scales; stem length up to 72-inches; ranges from —100 to 1000°F or —100 to 500° C.

Call your Weston representative for full details, or write: Weston Instruments Division, Daystrom, Inc., Newark 12, New Jersey. International Sales Division, 100 Empire St., Newark 12, N.J. In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 19, Ontario.

DAYSTROM, INCORPORATED
WESTON INSTRUMENTS DIVISION
Weston for Dependable Accuracy

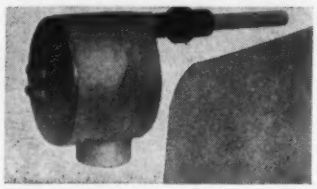
Check 3267 opposite last page.

Vacuum tubes not used in level detector

Uses: High- and low-level detection of liquids, granular solids and liquid/liquid interfaces.

Features: Solid-state circuit design precludes use of vacuum tubes.

Description: Electronic level switch incorporates unitized



Electronic level switch is suitable for high- and low-level detection of liquids, granular solids, and liquid/liquid interfaces

explosion-proof construction. Models are available for operation on 115 v 60-cy AC (Standard-12 or 24v DC).

(Electro-O-Probe B-07 is product of Instruments, Inc., Box 556, Tulsa, Okla.)

Check 3268 opposite last page.

Unit measures turbidity up to several hundred feet away

Uses: For applications in breweries, distilleries, pulp and paper manufacture, sugar and oil refining, water supply and filtration plants and in the chemical and pharmaceutical industries.

Features: Flow cell may be installed convenient to the process piping and the indicating control unit may be remote up to several hundred feet.

Description: Turbidity control unit consists of two basic parts — the flow cell through which passes the liquid to be analyzed — handy indicator-control unit. In addition, several types of circular or stripped-recorders may be used for other forms of control.

Turbidity measurement is performed by measuring the light absorbed by the liquid stream using a photoelectric

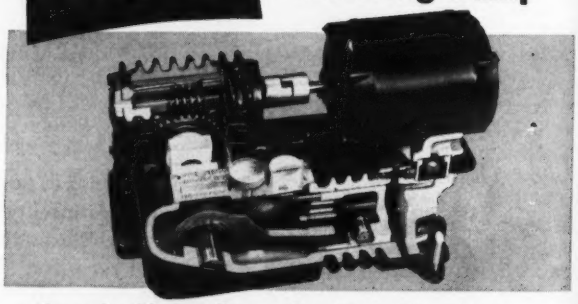
One **DETECTO**
Speed Scale does the work of *two* operators

Streamline your plant operation with this trouble-free, simplified, highly sensitive scale. The slightest discrepancy of over-weight or under-weight is instantly revealed by DETECTO'S over-under indicator. Write for information on full line of industrial weighing equipment from 1/100 oz. to 100 ton:

Detecto Scales, Inc. Dept. J-1, 540 Park Ave., Brooklyn 5, N.Y.

Check 3269 opposite last page.

New MADDEN *Metriflow* Metering Pump



the only thing ordinary about it is the price!

- Unitized construction; no moisture or dirt gets in— no oil or grease leaks out.
- Built like a tank. Machine-cut gears; outboard bearings on drive shaft; piston-supported diaphragm.
- Ideal for slurries and corrosive liquids; solution heads available of stainless steel, Hastelloy, etc.
- Duplex models double capacity from one motor, by alternating power strokes.
- 4 standard sizes—0 to 10, 18, 36 or 54 GPH; pressures to 300 psi. Adjust capacity while operating.

THE MADDEN CORPORATION
1345 Jarvis Ave., Chicago, Ill.
Write For Full Information

Check 3270 opposite last page.

circuit in the flow cell. Range of instrument is 0-50% obscurity, 0-20 nephelos, 0-375 FTU or other units of measurement.

(Model 1258 Flow Turbitrol is product of Meltronics Inc., 1010 N. Main St., Elkhart, Indiana.)

Check 3271 opposite last page.

Bubble secrecy pierced by utrasonic detector

Uses: Detection of bubbling in liquids, open or closed vessels, pipes or flumes.

Features: Detector can handle fluids in viscosity range of 1 to 30,000 centipoise. Individual bubbles as small as 0.001" diam are detected as readily as large quantities.

Description: Ultrasonic bubble detector's output signal varies with both size and number of bubbles in liquid. It can be coupled with any type of indicating, recording or controlling instrumentation or alarm to monitor bubbles in liquid or resultant surface foam.

Sensing head assembly is connected to amplifier unit which may be remotely located. Pulsed ultrasonic signal passes through liquid which is flowing between transmitter and receiver heads. Presence of bubbles naturally weakens or interrupts signal.

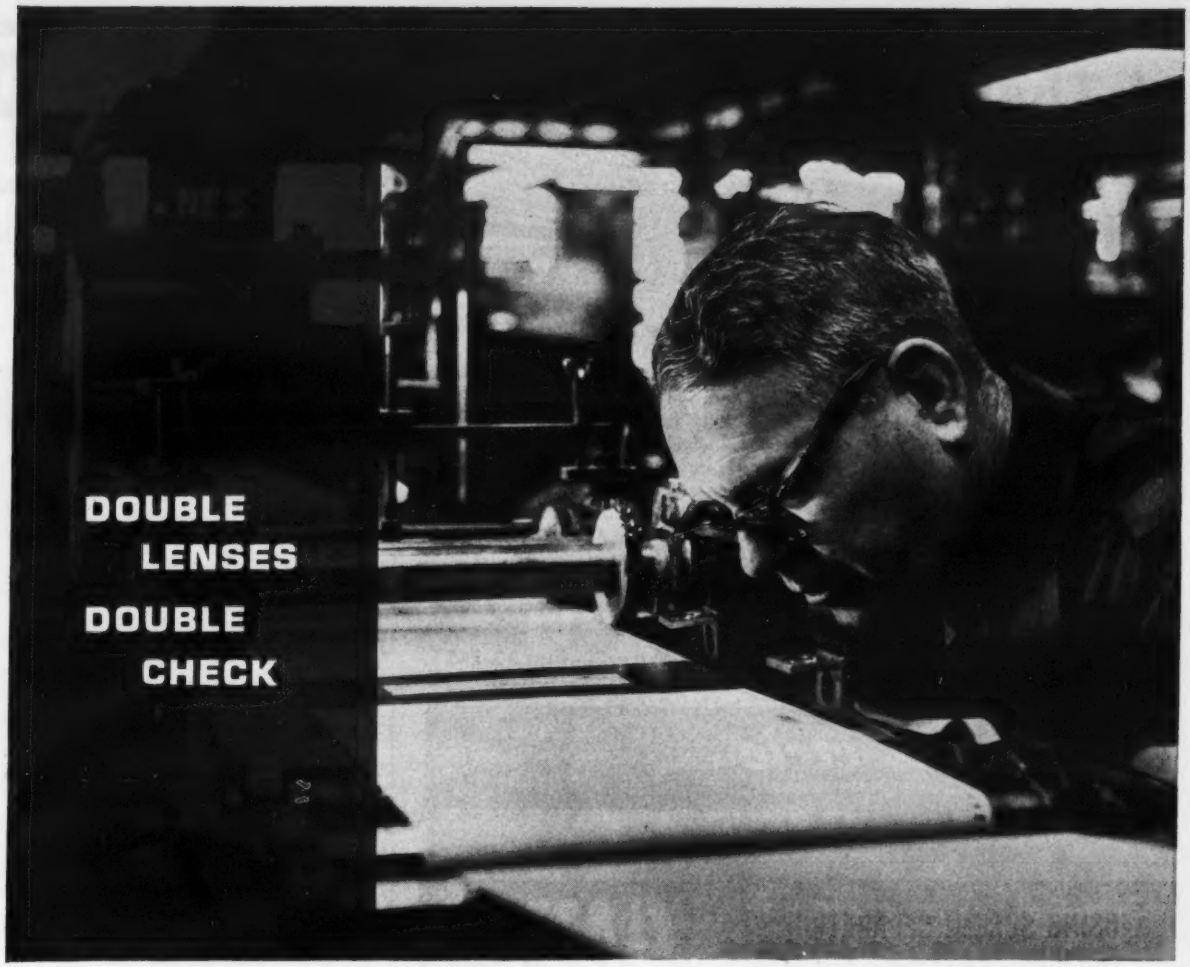
Standard head assembly handles temperatures of 180°F, pressures to 100 psi. Amplifier assembly operates to temperatures of 135°F. Amplifier response time is less than 0.1 sec for 63%.

(Ultrasonic bubble detector is considered in Tech Sales Letter 6 and Bubble Detector Flow Data Sheet—Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y.)

Check 3272 opposite last page.

Laboratory apparatus of all types is inventoried in 16-page catalog listing and describing, among other items, a complete line of laboratory heating jackets with plastic housings. "What's New" 39 — Scientific Glass Apparatus Co., Inc.

Check 3273 opposite last page.



...for the precise calibration that means
RECORDING CHART DEPENDABILITY

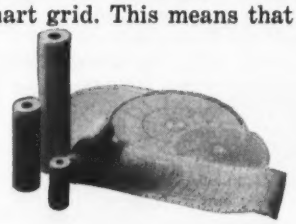
Charlie Robinson, our pressroom supervisor, is making a careful chart calibration check in the picture above. He does this often.

To make this test Charlie uses two engraver's glasses, a special templet... and the 50 years of chart printing experience that stands behind every GC Recording Chart.

What this test involves is making sure that the center line of the circular punches on a GC Strip Recording Chart is always the same distance — the *correct* distance — from the zero line of the chart grid. This means that a 25 psi recording at the end of a process, for example, will have the same value as a 25 psi recording at the start.

Take rigid inspection standards like these — and add repeated paper and ink tests, continuous humidity control in production and storage areas, and speed of printing and delivery. You'll see why more than 5,000 chart users rely regularly on GC dependability.

GC stocks more than 15,000 different chart types. We design and print charts for special purposes. Why not send now for the GC Stock List and for specific sample charts?

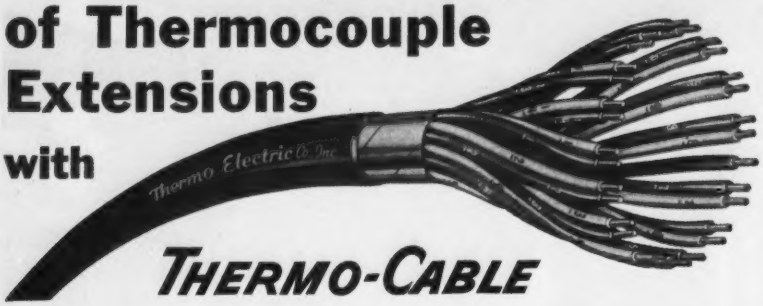


GC RECORDING CHARTS

Distributed by:
TECHNICAL SALES CORPORATION
189 Van Rensselaer St., Buffalo 10, N. Y.
A Subsidiary of
GRAPHIC CONTROLS CORPORATION
Buffalo 10, N. Y.

Check 3274 opposite last page.

Reduce Installation Costs of Thermocouple Extensions with THERMO-CABLE



You can now install 6 to 56 pairs of thermocouple leads at one time with "Thermo-Cable," T-E's new multi-conductor extension cable. Installed in conduit, "Thermo-Cable" reduces costs by eliminating the need to pull individual conductors—and permits the use of smaller conduit for the same number of leads. "Thermo-Cable" can also be installed without conduit, in open troughs or in raceways.

"Thermo-Cable's" smooth, polyvinyl chloride outer jacket resists moisture, heat, abrasion and chemical action—and slips easily through conduit. ISA color coded, individual conductors are also insulated in hi-temp (221°F.) polyvinyl chloride—and the conductor bundle is wrapped in aluminum-backed Mylar tape. Pairs are numbered alike and lie next to each other. "Thermo-Cable" is available in 6, 14, 18, 25, 39 or 56 pairs and comes in all standard thermocouple materials.

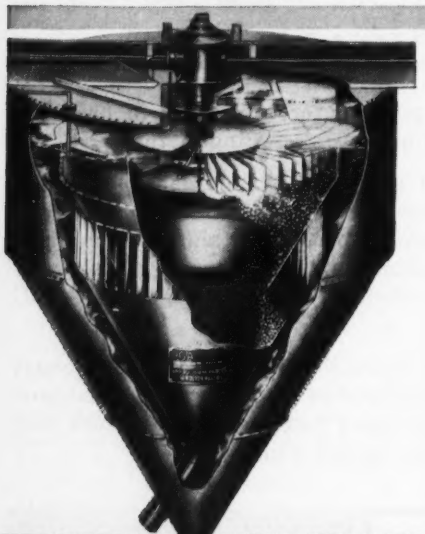
Write For Wire Section 33-E-5

Thermo Electric CO., INC.
SADDLE BROOK, NEW JERSEY

In Canada:
THERMO ELECTRIC (Canada) LTD.,
Brampton, Ont.

Check 3275 opposite last page.

USING SCREEN SEPARATIONS? NOTHING CLASSIFIES AS PERFECTLY AS AIR



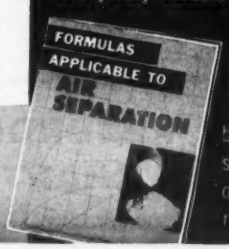
GAYCO

CENTRIFUGAL AIR SEPARATORS

Classify practically all dry fine materials

You get:
- CLOSER SEPARATIONS
- IMPROVED PRODUCTION
- NO UNDESIRABLE OVERSIZE.

RANGE 60 to 400 mesh. Timken bearings. Choice of Standard or Heavy Duty Models.



this helpful booklet sent on request

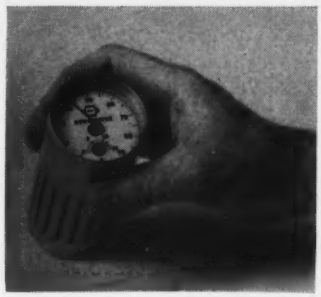
Robert M. Gay Division
UNIVERSAL ROAD MACHINERY CO.
117 Liberty St., New York 6, N. Y.
Factory and Laboratory: Kingston, N. Y.
In Canada: Watson-Jack Hopkins Ltd., Montreal

Check 3276 opposite last page.

Moisture secrets shared with precise hygrometer

Uses: Detection of relative moisture content of gases, liquids and solids.

Features: Hygrometer responds only to water and is capable of reading relative-moisture content over full range of completely dry to soaking wet. It functions reliably at extremely high or low temperatures.



Hygrometer is capable of reading relative-moisture content over full range of completely dry to soaking wet

Description: Hygrometer utilizes principle of moisture-sensitizing based on processed natural vegetable fiber. It is unaffected by most common solvents and other non-corrosive materials.

(Xerometer is product of Advanced Instrument Corporation, 700 S. 4th St., Richmond, Calif.)

Check 3277 opposite last page.

Electricity takes powder in specific-gravity measurement

Varied applications possible with stock components

Uses: Direct and continuous measurement of specific gravity in flowing process liquids.

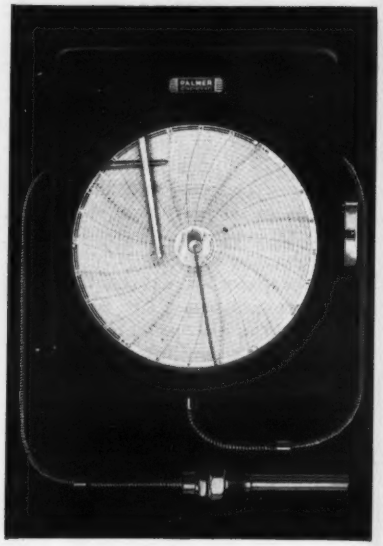
Features: Non-electrical instrument can be quickly changed to other process applications through selection of stock components.

Description: Specific-gravity measurement instrument has Pyrex body. It is resistant to most corrosive liquids due to Pyrex, tantalum and Teflon

PALMER

MERCURY ACTUATED RECORDERS

Into this modern Mercury Actuated Recorder has gone all the skill of Palmer Master Craftsmen



Readings are clearer, smoother and more precise than ever thought possible. In fact readings are so amazingly improved that maintenance is never needed under normal uses.

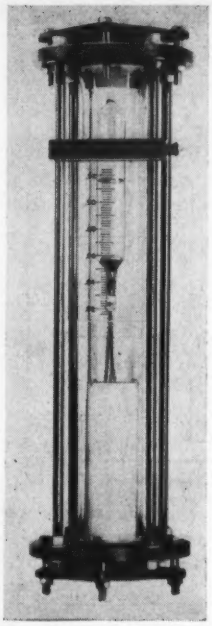
Recording Thermometers feature twelve inch die-cast aluminum case with black wrinkle or white satin finish. Single or multiple pen construction. Electric or spring wound clock, 24 hour or 7 Day Revolution. Flexible Armor and bulb of stainless steel. Ranges: —40 to 1000°F. or Equivalent in °C.

Send for Bulletin No. 45
Consult your Classified Directory

PALMER

PALMER THERMOMETERS, INC.
Mfrs. of Industrial Laboratory, Recording and Dial Thermometers
Cincinnati 12, Ohio

Check 3278 opposite last page.



Specific-gravity-measuring instrument is non-electric unit for direct continuous indication in flowing process liquids

wetted surfaces. Sensing device is totally submerged, chain-weighted Pyrex plummet. Anti-parallax marker on plummet, sighted through external scale, gives accurate reading.

Accuracy is ±1% of total scale. Any 0.05 or 0.10 specific-gravity span within limits of 0.65 and 1.40 can be selected.

(Princo Denistrol W-756 is product of Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia 30, Pa.)

Check 3279 opposite last page.

Accurate count delivered by proximity switch

Uses: Counting, bottling and packaging applications.

Features: Moisture-proof switch may be submerged and used where oils, dust and other foreign materials are present without interference with operation.

Description: Magnetic proximity switch is actuated by presence of any ferrous metals within its field. In operation, toggle-type stack switch

EC&M *Fuseless* AIR-BREAK STARTER GIVES Certified 100/150 MVA FAULT PROTECTION

NO SINGLE PHASING FROM BLOWN FUSES!

NO COSTLY REPLACEMENT FUSES TO STOCK!

✔ Gang-operated Disconnect Switches Grounded for Safety in Open Position. Mechanically Interlocked with Contactor... Never Open Under Load

✔ No Fuses. Bus Bars Throughout

✔ 3-way Door Interlock. On, Off and Open—with Positive Interlocking between Door, Disconnect and Contactor for Maximum Personnel Protection

✔ Heavy-duty DC Operating Magnet. No Chatter—No Hum

FRONT ACCESSIBLE WITHOUT ROLL-OUT!

Phase barrier and arc-chutes slide out. All starter parts exposed and accessible for easy inspection and maintenance

Get the complete story on certified fuseless fault protection for high-voltage motor drives. Write for Bulletin 8130A

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

wherever electricity is distributed and controlled

2635

Check 3280 opposite last page.

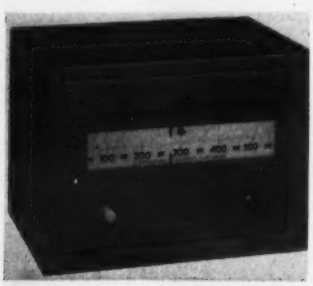
is actuated through non-magnetic barrier by magnetic force. On one side of barrier is float (or other means) actuating armature of magnetic material and, on other side, switch containing Alnico V permanent magnet.

(Magnetic proximity switch is product of Jo-Bell Products, Inc., Oak Lawn, Ill.)

Check 3281 opposite last page.

Accurately measures processing temp

Indicating temperature controller features a 10″ slide rule read out based on a stable null balance servo system. Temperature control is maintained electronically without depending on the meter movement for control. Temperature indication always presents a true readout of temperature of the process being controlled throughout entire range of



Indication accuracy is ±½% of scale range

the instrument without limiting stops. Indicating pointer can be clearly seen by the operator at some distance.

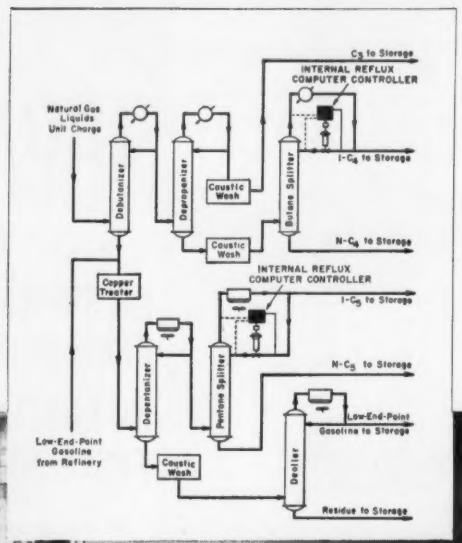
Instrument is available with either time proportioning or on-off control, with or without anticipating section. Control stability of the proportioning model with anticipating section has been achieved to ±0.1°F. It is ±0.5°F with the on-off model with anticipation. Indication accuracy is ±½% of scale range. High and low alarm contacts can be provided as an optional feature.

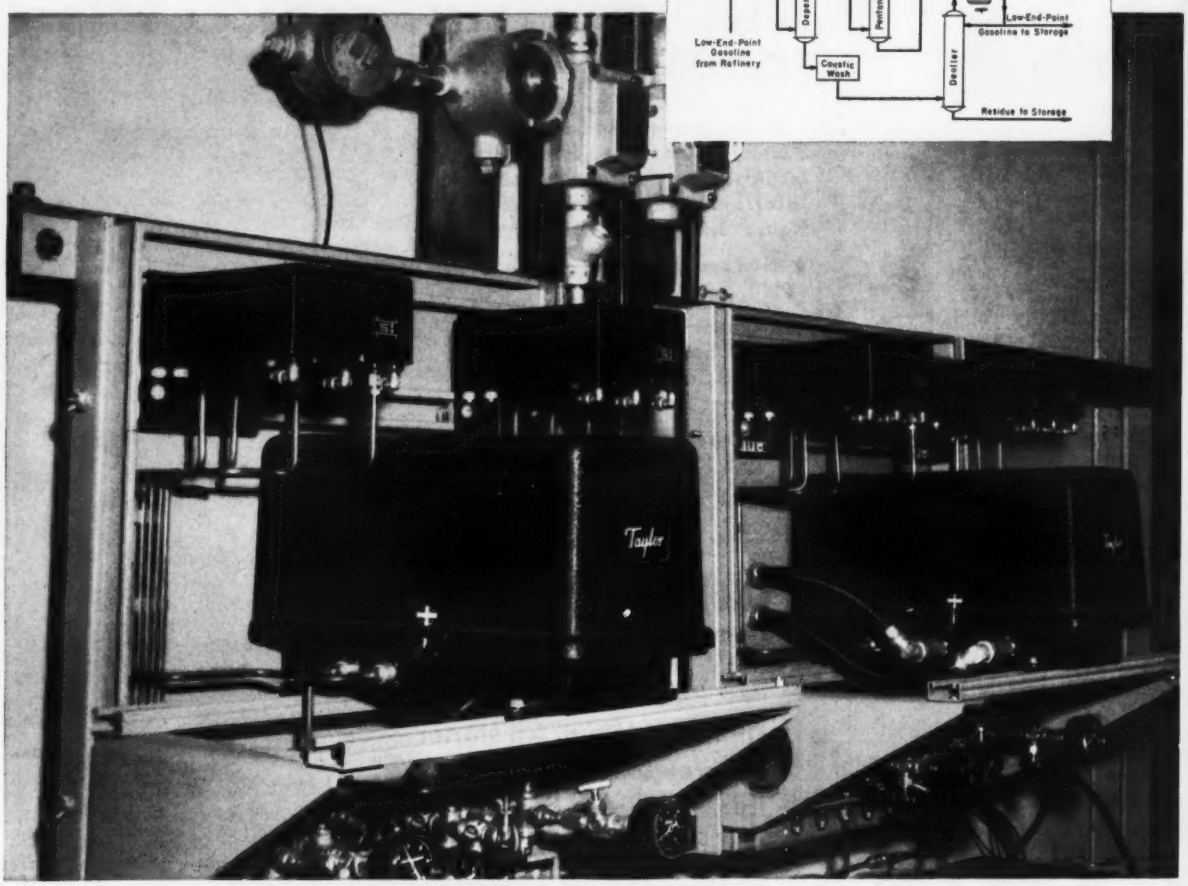
Control is provided with plug-in plastic encapsulated circuitry. This provides freedom from dust and moisture

MORE PROFIT PER

Drawing at right shows the Taylor Internal Reflux Computer System, installed at Phillips' Sweeny, Texas, Refinery on LP gas fractionation columns. It can be supplied with either pneumatic or electrical output. It fits into any control system already installed—also into any large scale digital or unit analytical computer installation. Set point can be adjusted manually by the operator or automatically from column temperature, process analyzers and/or computers, etc.

Components are all standard, proven units. The Taylor Potentiometer Transmitter permits the use of thermocouples in place of special resistance elements for narrow span differential temperature measurement.





Taylor Computer-Controllers in use on the light ends fractionation system, typical of several systems in use as shown in drawing above.

Taylor Instruments

BARREL OF PRODUCT...

Phillips Petroleum Co. reports optimum fractionator efficiency with Taylor Internal Reflux Computer Control

THE Taylor Internal Reflux Computer Control System consists of the addition of a simple analog computer to a fractionating column. It maintains optimum reflux flow by instantly compensating for climatic effects encountered in outdoor installations. This means:

1. Consistent product quality—no rerunning or blending.

2. Maximum utilization of existing installation.

3. Minimum consumption of steam, air and water.

4. Elimination of flooding—run to design capacity without loss of product.

5. Increased production with no process change. Adaptable to any column design and existing piping and instrumentation.

• • •

Here are Phillips Petroleum Company's answers to questions commonly asked about this system:

Are steam savings effected when using Internal Reflux Computer Controls?

"They minimize reflux adjustments necessary for day and night ambient temperature changes, thereby effecting steam savings. At the same time they contribute to the maintenance of overhead product specifications. A lower reflux ratio obviously saves steam".

Are increased product yields realized by use of computer-controls?

"While it is difficult to pin-point exact increases, we can say they permit continued tower operation at maximum load levels. Without reflux computer-controllers, column operation must be at a less efficient level to reduce hazard of flooding".

Does use of computer-controllers permit use of lower reflux-to-product ratio?

"Yes—particularly when operating to maintain product specifications, such as a minimum of 95% isopentane overhead product. Without computer-controllers it would be necessary to operate at 97% isopentane to insure a minimum 95% product".

Do computer-controllers help meet product specifications?

"Yes—they compensate and 'short-stop' transient column conditions resulting from minor temperature, pressure and feed composition changes. It is no longer necessary to have product samples analyzed in the laboratory to serve as a guide for the operator to make changes in external reflux flow rate".

Are plant operators pleased with the performance of computer-controllers?

"They are well pleased with the installations. They appreciate the smoother column operation and ease of meeting product specifications."

• • •

Ask your Taylor Field Engineer about this system, developed and licensed by Phillips Petroleum Company, or write for **Bulletin 98374.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ontario.

MEAN ACCURACY FIRST

Check 3282 opposite last page.

and insures continued operation under conditions of shock and vibration.

(Series 5000 indicating temperature controller is product of Electronic Processes Corporation of California, 436 Bryant Street, San Francisco 7, California.)

Check 3283 opposite last page

Carbon changes of 1 ppm can't slip unnoticed past analyzer

A sensitivity of 200 ppm can be extended to 2000

Uses: Continuous measurement of organic matter dissolved in water, particularly in plant-waste streams.

Features: Analyzer has sensitivity to organic-carbon concentration changes of approximately 1 ppm. Full-scale sensitivity of 200 ppm organic carbon can be extended to about 1000 ppm.

Description: In operation, waste-water organic-carbon analyzer employs number of chemical reactions as well as physical measurements.

Organic matter in sample to be analyzed is oxidized to carbon dioxide by a hot chromic-acid solution. Carbon dioxide produced is carried to thermal-conductivity analyzer by stream of oxygen. Its concentration, representing total organic carbon, is continuously recorded.

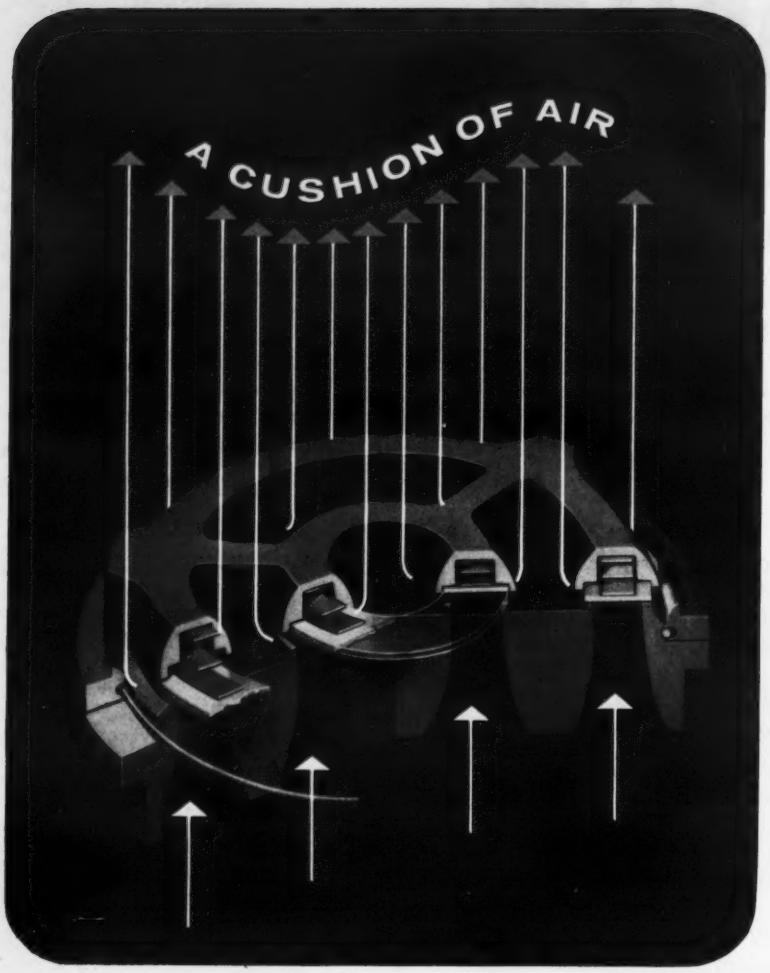
Provision is made for automatic analysis of batch samples. Recorded chart is automatically marked when such analyses are made. Variety of safety interlocks are built into instrument to shut-down components in case of malfunction.

(Waste-water analyzer is product of Lockwood & McLorie, Inc., Box 113, Hatboro, Pa.)

Check 3284 opposite last page.

Laboratory apparatus is featured in 344-page catalog which covers laboratory ware of all types. Cat 80A60 — Fischer & Porter Co.

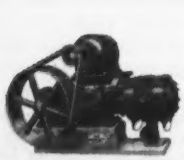
Check 3285 opposite last page.



makes PENNSYLVANIA COMPRESSORS run efficiently...silently...with minimum maintenance. Stainless steel valve discs lift against a cushion of air in the simple, efficient design of the Air Cushion Valve that makes PENNSYLVANIA Compressors run so silently, so dependably, and with such low maintenance requirements. Air Cushion Valves have no nuts, bolts, or screws to break or burn fast. You get longer valve life . . . eliminate wear . . . eliminate noise caused by metal striking metal. Flat valve discs have no flexing or bending action to weaken or distort them; they remain perfectly flat and tightly seated over long periods of service.

But this is only part of the PENNSYLVANIA story. Learn all the facts in "Compressors For Industry." It describes PENNSYLVANIA Compressors from 10 to 350 hp, horizontal, angle, and OILFRE models. Write to Dept. A-7 for your copy today.

PENNSYLVANIA
PUMP AND COMPRESSOR COMPANY
Easton, Pa. • Earning Customer Confidence Since 1920



Check 3286 opposite last page.

INSTRUMENTS & LAB

Measures temperature in deep vats

Accurate measurement of temperatures in deep vats, kettles, tanks, stacks, ovens, ducts, and other such vessels is possible with giant-stemmed stainless steel thermometer. Unit will withstand pressures

Giant-stem thermometer provides accuracies within 1% of full scale reading

up to 3476 psi and can be used for both liquids and gases. It is hand calibrated for accuracies within 1% of full scale reading.

Temperatures up to 1000°F can be measured with the 6′ stem thermometer. Large 5″ dial makes reading easy.

(Six-foot stem thermometer is product of W. C. Dillon & Co., Inc., 14620 Keswick St., Van Nuys, Calif.)

Check 3287 opposite last page.

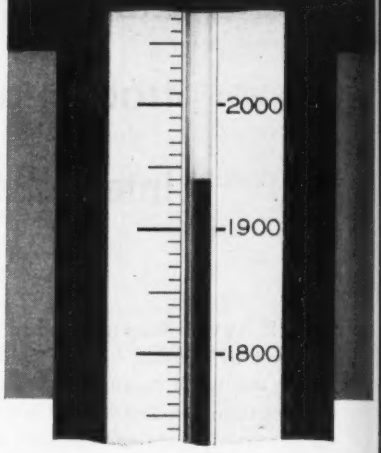
Smallest centrifugal ever slated for double role

Uses: Evaluation of new slurries on pilot-plant scale.

Features: Centrifugal is said to be smallest ever produced. It is 10″ model. Model can, in addition to pilot-plant application, be employed in actual production calling for extremely low rates.

Description: Automatic universal centrifugal includes all mechanical-operating and automatic-timing features of larger standard machines. Its design permits results to be extrapolated directly to pro-

MEASURE BULK LIQUIDS with *The King-Gage*



Gain Accuracy, Save Time, Eliminate Risk or Doubt

With the King-Gage, you can measure the *weight, depth* or *volume* of *any* liquid in *any* storage or processing vessel - - quickly, safely and accurately, from any desired location.

Throughout industry, King-Gages are guarding against shortages, errors in receipts and deliveries, inaccuracy in mixing and formulating, and losses in processing. They eliminate the hazards of climbing on tanks; and in man-hour savings alone, they often pay for themselves in 6 to 12 months.

King-Gages work as a frictionless balance, with no wearing parts - - operate on the U-tube principle, whose accuracy is inherent. They measure continuously and are read at a glance. Scales are graduated in any units desired.

Serviced Locally. There's a King-Gage distributor near you, factory-trained to discuss application details and to give prompt service whenever needed. You can depend on him.

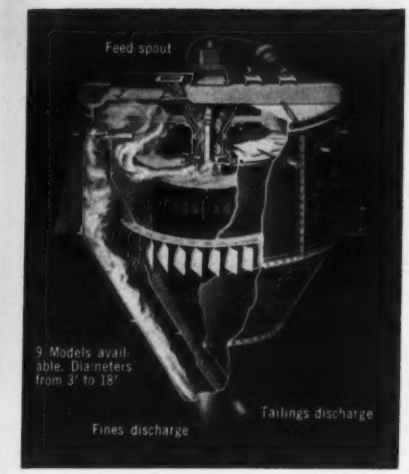
KING-GAGE CATALOG 1010 gives further details; shows many applications. Write for it.

KING ENGINEERING CORP.
3207 S. State St. Ann Arbor, Mich.
DISTRIBUTORS IN 34 PRINCIPAL INDUSTRIAL CENTERS

Check 3288 opposite last page.

Size Requirements Getting Tougher?

Sturtevant Air Separators Increase 40 to 400 Mesh Output as Much as 300%



Closed-circuit air separation is of proved advantage in reduction processes. Result is a better, more uniform product. Grinding mills perform at top efficiency, output frequently increases as much as 300%, power costs drop as much as 50%.

Precise separation of all dry powdered materials. Sturtevants currently classify sulfur, soybeans, phosphate, chocolate, feldspar, sand and aggregates, pigments, limestone fillers, flour, abrasives, plastics, gypsum, ceramics, cement and other products.

Improve screening — Sturtevant Air Separators prevent blinding by removing undesirable tailings *or* fines from screen feed loads.

Works Like Winnowing Done in a Whirlwind

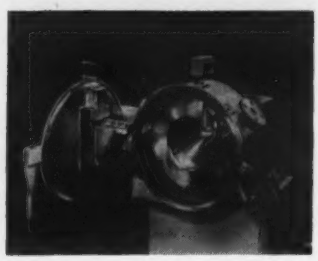
Sturtevant Air Separators do a mechanical job of winnowing. Precise control of whirlwind air currents and centrifugal force results in the desired size being lifted into fines cone, oversize falling into tailings cone.

A 16 ft. Sturtevant, for example, has taken a feed rate of 800 tph, containing only a *small* percentage of desired fines, and delivered 30 tph 90% 200 mesh, recirculating the oversize through the grinding circuit.

Send for Bulletin No. 087.

STURTEVANT
MILL COMPANY
119 Clayton St., Boston, Mass.
Crushers • Grinders • Micron-Grinders • Separators
Blenders • Granulators • Conveyors • Elevators

Check 3289 opposite last page.



Automatic universal centrifugal incorporates all mechanical-operating and automatic-timing features of larger standard machines

duction-size equipment. Timing arrangements include provision for extremely rapid cycles. Machine can operate at speeds to 3500 rpm and centrifugal forces to 2000 times gravity.

(Universal centrifugal HS 10 W is product of Chemical Machinery Division, Baker Perkins Inc., 1000 Hess, Saginaw, Mich.)

Check 3290 opposite last page.

NEW LITERATURE
Process Instrumentation and Laboratory Apparatus

Glass labware is cataloged in 12-page Vycor® Laboratory Glassware Bul—Burrell Corporation.

Check 3291 opposite last page.

Temperature-control packages are detailed in 12-page bulletin explaining operation, circuitry and safety features of three types of thermocouple-actuated units. Bul 108 — Assembly Products, Inc.

Check 3292 opposite last page.

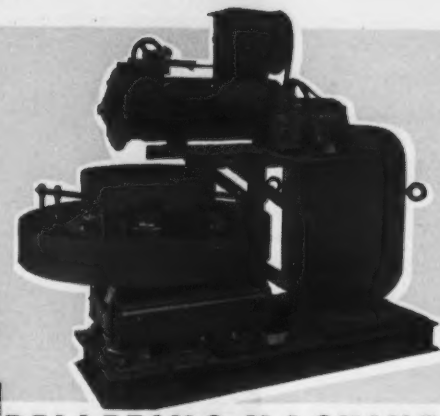
Electrical flowmeters of remote-reading type, for all types of liquids and gases at line pressures to 5000 psi, are delineated in 20-page Bul 59-5 — Republic Flow Meters Company, Subsidiary of Rockwell Manufacturing Company.

Check 3293 opposite last page.

High-speed process chromatograph (1859) and use of chromatography for closed-loop process control (1860) are subjects of two four-page brochures, Buls 1859 and 1860 — Analytical & Control Division, Consolidated Electrodynamics Corp., Subsidiary of Bell & Howell.

Check 3294 opposite last page.

NEW SOLUTION To Your PELLETING PROBLEMS



Daffin PELLETING MACHINERY
GREATER OUTPUT AT LOWER COST

Pellets of SUPERIOR uniformity, density, firmness, with or without steam and binders. From ⅛" to 1" diameter—lengths to 2" or more—round and other shapes—coarse or fine materials.

Unique, new, simplified design. Easier, more economical to operate, maintain. Special stationary die, horizontal head. Alloy construction as required. Daffin engineers will help develop exclusive pellet processing system tailored to your operation.

WRITE FOR FREE BULLETIN L-109

DAFFIN MANUFACTURING COMPANY
INDUSTRIAL DIVISION
3356 NORTH PRINCE STREET, LANCASTER, PENNSYLVANIA

Check 3295 opposite last page.

New...from MARSH!

Conduit-type Master-mite. Grommet-type also available.

Small Solenoid Valves that fill a BIG Order

Designed to meet the need for positive-acting tight-seating valves for use on wide variety of media, including oxygen, hydrogen, acetylene, etc.

Two Types:
Conduit type and grommet type. Port sizes 1/8" and 1/4" NPT.

Ten orifice sizes: 3/64" through 1/4".

Wide range of voltages:
Standard with 115 V. A. C. but also available in 12, 24, 208, 230, 460 V. A. C.

Pressure to 540 psi.
Small, but with more strength in the Marsh manner. Coils never overheat. Entire assembly leak tight. Remarkably quiet operation. Cleanable without breaking connections. Used in any position. Bodies either brass bar stock or 18-8 stainless steel. All moving parts stainless. Underwriters' approved for use on oxygen and hydrogen and as safety valves.

Write for new bulletin

MARSH INSTRUMENT COMPANY
Dept. Z Skokie, Illinois
Division of Colorado Oil and Gas Corporation
Marsh Instrument & Valve Co., (Canada) Ltd., 8407 103rd St., Edmonton, Alberta, Canada, Houston Branch Plant, 1121 Rothwell St., Sect. 15, Houston, Texas.

Check 3296 opposite last page.

Typical control panel at Union Carbide's Institute Plant has over 100 Foxboro Consotrol* indicators, recorders, and controllers.

for Union Carbide's Institute Plant...rapid,

A sprawling chemical metropolis, stretching as far as the eye can see. That's Union Carbide Chemicals Company's Institute, West Virginia plant — producer of Ucon† Fluorocarbon propellants and refrigerants.

Foxboro instrumentation is used to help control 20 of the different processing units at the Institute Plant. Over 10,000 Foxboro indicators, controllers, recorders, and transmitters are used, as well as thousands of Foxboro control valves.

Union Carbide reports favorably on their Foxboro instruments. "In general, we find them easy to work on, easy to repair, easy to maintain." And the company adds, "we appreciate the ability of the Foxboro engineers who work with us."

*Reg. U. S. Pat. Off.
†Trade-mark of Union Carbide Chemicals Co.

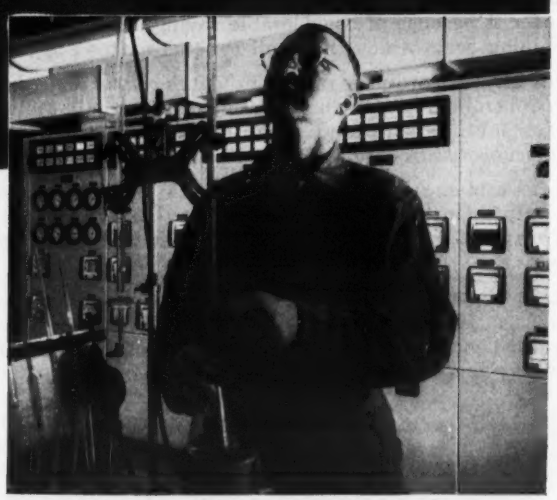
Process is hydraulic — requires fast, sensitive instrument response.

sensitive Foxboro control

You'll like working with Foxboro, too. Unsurpassed instrumentation, both pneumatic and electronic; unsurpassed engineering and service. Ask your local Foxboro Field Engineer for the complete story. Or write for Bulletin 13-18. The Foxboro Company, 817 Norfolk St., Foxboro, Massachusetts.

FOXBORO

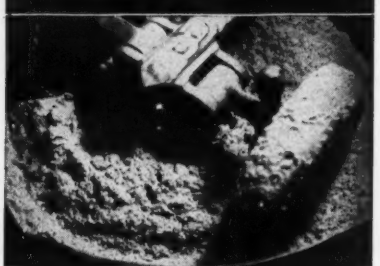
REG. U.S. PAT. OFF.



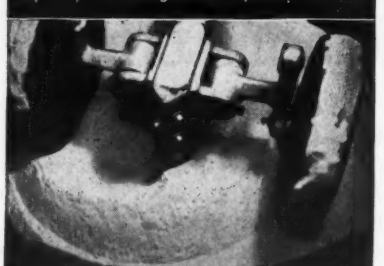
Lab analysis is done right in the control room of this Carbide processing unit. Necessary process adjustments can be made on Foxboro controllers the minute technician detects the need.

For more information on product at left, specify 3297 see information request blank opposite last page.

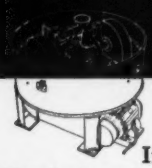
GOING: Mix is wetted. Dispersion of resin-alcohol begins as lumps form.



GOING: Smearing, spatulate action breaks up lumps as mulling action disperses moisture.



GONE: Agglomerates almost gone as blending nears completion. Mix is homogenous, thorough, and quickly achieved.



In the foundry industry the "Shell Process", a special blend of sand, alcohol and resin, is used to achieve a mold which leaves the casting surface extremely smooth. It also insures a casting of uniform strength and dimensional stability. Operators are willing to pay more for raw materials for it because of considerable savings in time, labor and reduced machining costs which the Shell Process makes possible.

They have learned, too, that ordinary mixing practices *cannot be used* in the Shell Process. Controlled, *intensive* mulling in a Simpson Mix-Muller is one of a very few methods of blending which can accomplish the desired dispersion, *without* segregation of resin binder and sand.

Applications such as this one are typical of the way in which *controlled* Mix-Mulling is helping operators everywhere to achieve better blends of critical material with resultant *savings* in raw materials and reprocessing time.

This is why we say—if the Mix-Muller is right for *your* product . . . money couldn't *buy* you a better, *and more economical* blend of materials. Why not write for a copy of: "*Mulling In the Chemical Process Industry*".

SEE PAGES 1263-1266 CEC FOR MORE DETAILS

SIMPSON *MIX-MULLER* DIVISION
National Engineering Company
640 Machinery Hall Building • Chicago, Illinois

P-358

Check 3298 opposite last page.

INSTRUMENTS & LAB

Data-processing system is expanded upon in four-page bulletin which incorporates specification table. Bul S-4017—Scientific and Process Instruments Division, Beckman Instruments, Inc.

Check 3299 opposite last page.

Micropipettes and their controls and related microtransfer devices, such as syringe pipettes, miniature-delivery syringes and gas-tight syringes, are depicted in 20-page Lambda-Pettes® Cat—Research Specialties Co.

Check 3300 opposite last page.

Transducer, which can change 0.01" of mechanical motion into stepless control of up to ¼ kw power, is delineated in four-page Bul 5.501—Electric Regulator Corporation.

Check 3301 opposite last page.

Laboratory equipment, including instruments, appliances and other units are pictured and described in 48-page Bul FS-213—Fisher Scientific Company.

Check 3302 opposite last page.

Kraft-digester-control systems, based on temperature-difference measurement, are pictured in four-page bulletin which includes flow diagrams. Bul 411 — Bailey Meter Company.

Check 3303 opposite last page.

Infrared spectrophotometer is explained in four-page bulletin including reproductions of representative spectra obtained with unit. Infracord 137-G Bul—Perkin-Elmer Corporation.

Check 3304 opposite last page.

Digital tape recorder/reproducer systems to meet a broad range of computer, industrial and laboratory requirements are discussed and illustrated in four-page Bul 1618 — DataTape Division, Consolidated Electrodynamics Corporation.

Check 3305 opposite last page.

Glass labware is summarized in 46-page catalog. Wide variety of equipment is included in Cat ML-61—Labglass, Inc.

Check 3306 opposite last page.

Pressure and temperature recorders are depicted in eight-page catalog including diagrams showing case dimensions of various units and details of pressure and temperature connections. Cat 800 — U. S. Gauge, Division of American Machine and Metals, Inc.

Check 3307 opposite last page.

Corrosion and scale troubles retreat before latest advances in . . .

Taming Phosphoric Acid Evaporations

RICHARD C. BENNETT
Process Engineer
Swenson Evaporator Company
Division of Whiting Corporation
Harvey, Illinois

One of the toughest applications for evaporators is concentrating phosphoric acid. Corrosion and scale formation environment is such that it plays havoc with the equipment unless the proper design is used. Until recently, even with the best care, units lasted only a few years and maintenance costs were high.

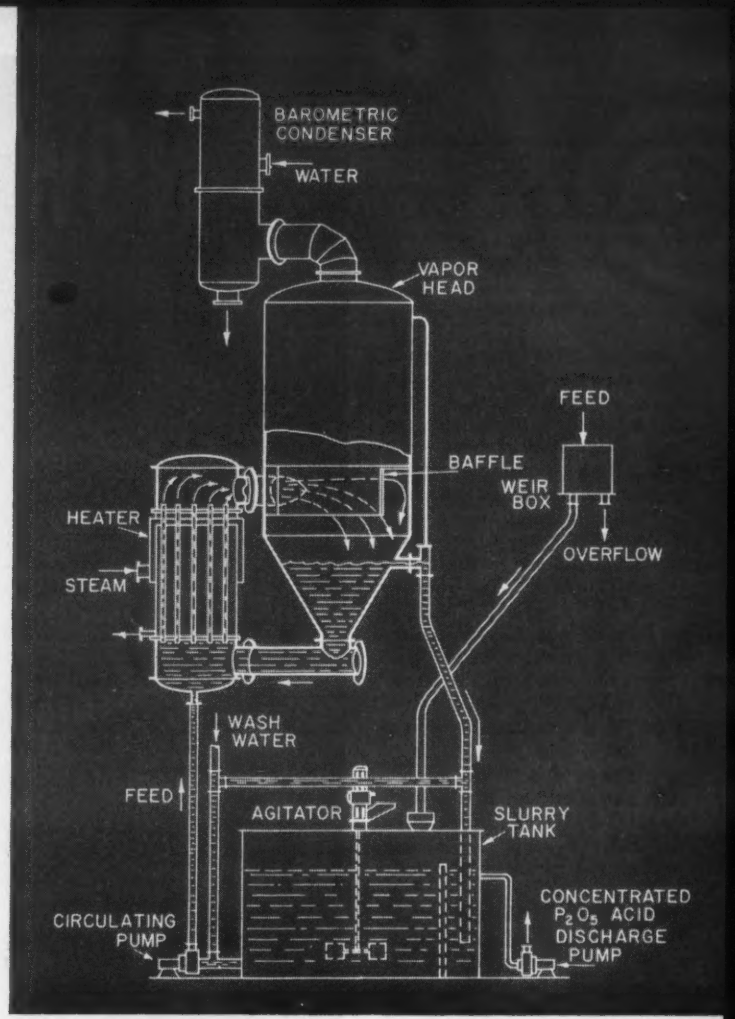
Modern phosphoric acid evaporators are the result of a long series of changes and developments. Recent improvements have extended the useful life of the equipment to a point where it can now be counted on to withstand years of rugged service.

To obtain these advantages, basic vessel construction is now either lead-lined or rubber-lined steel. Vapor heads may be rubber-lined if operation is within 160-180°F. Lead-lined fabrication is required for higher temperatures.

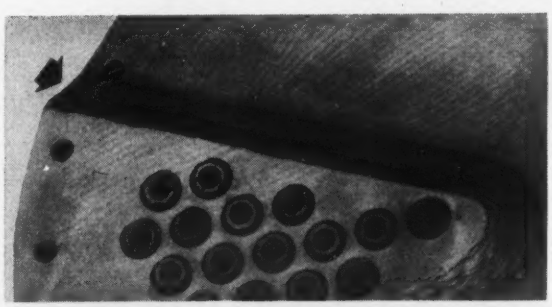
Most modern phosphoric acid evaporators operate under vacuum. Latest designs feature an internal baffle which directs the vapor-liquid release from the evaporator's tangential inlet into the vapor head. This gives liquid a directed movement opposite in direction to that of the vapor leaving the machine. To protect the lead or rubber from erosion, special expendable wear bands are used. The overall design cuts entrainment losses to a minimum.

Another feature is that the tube bundle is placed outside of the evaporator body. Removable liquor chambers at each end of the bundle permit tubes to be easily cleaned, inspected or replaced.

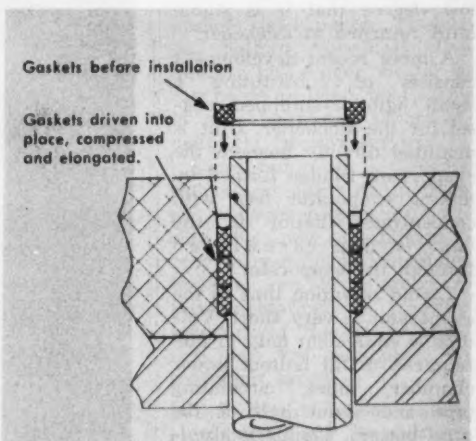
A ring-gasket method of tube attachment has been devised for installing carbon tubes. Technique simplifies servicing, provides for thermal expansion and extends service life. Tube sheet hold-



Evaporating equipment such as this can concentrate phosphoric acid continuously for 60-70 hours compared to 4-8 hours of earlier models. Agitator-equipped tank mounted below evaporator removes precipitated impurities from recirculating liquor. Removal of solids minimizes scale and salt deposition inside evaporator components



Photograph shows section of lead-lined tubesheet. Note built-up construction of tubesheet, which is composed of many layers of lead (arrow) burned one on top of the other to achieve final thickness. Lead used in this service seems to resist corrosion almost indefinitely



Cross-section drawing illustrates how ring gaskets are used to secure carbon tubes to lead-lined tubesheet

ing the tubes is of lead-lined steel construction with all lead homogeneously bonded under precise conditions to the steel tubesheet for maximum corrosion resistance.

Cleaning Simplified

Earlier evaporators merely concentrated acid on a batch basis for a few hours and had to be washed or boiled out frequently. Typical cycle for a 45% P_2O_5 horizontal-tube evaporator consisted of concentrating a batch every four hours. Once a day, unit would be washed out with high-pressure water. To remove scale, the evaporator had to be boiled out for 24 hours with low-strength acid. This was done about once a week.

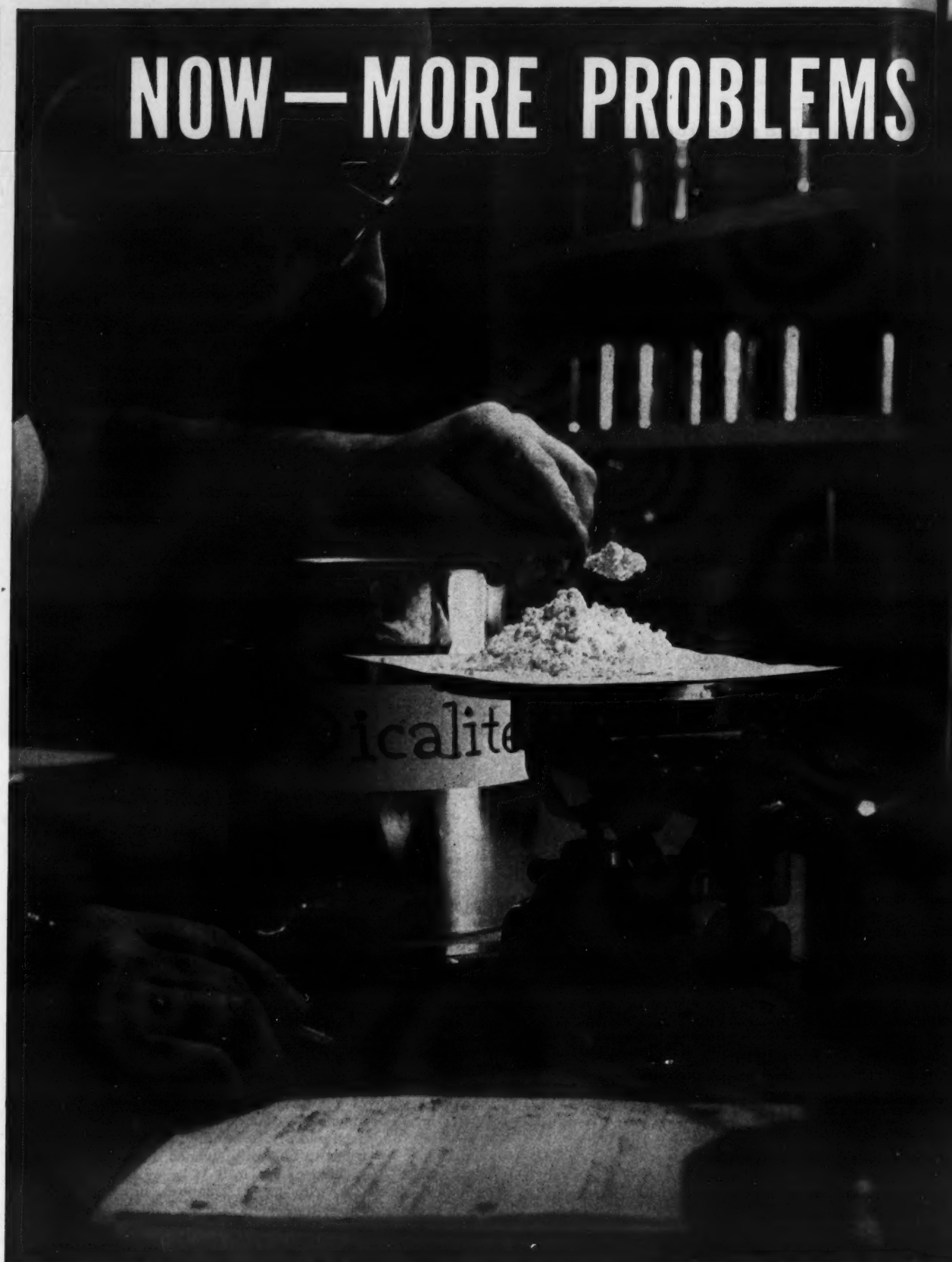
To simplify cleaning, the Weber recirculation system was developed. With it, acid is concentrated 2-3% higher than required and mixed with dilute feed. This causes precipitation of impurities whose solubility is less in the concentrated acid.

Precipitated impurities are removed in a thickener. Clarified acid is returned to the evaporator for further concentration. Recirculation is such that overall concentration per pass through the evaporator is about 2%.

Under these conditions, supersaturation is developed in the liquor passing through the evaporator. This is of such a low degree that it is stable until returned to thickener.

A more recent development consists of substituting a small agitator-equipped vessel for the thickener. Unit is mounted directly beneath the evaporator. Sludge formed by mixing evaporator feed with concentrated liquor in the tank is then circulated through the evaporator.

Liquid retention time in the evaporator is very short. Volume is equivalent only to that required to fill bottom liquor chamber, tubes, circulating pipe and about half of the cone bottom. Liquor is circulated at such a rate that average concentration per pass is quite low. Short retention times and small concentration increases minimize scale and



salt deposition within the equipment.

The agitator-equipped auxiliary vessel is also designed in such a way that discharge acid is taken from the circulated liquor before new feed is added. Evaporator therefore operates at discharge concentration, rather than 2% above as in the Weber system. This provides an additional advantage in that there is a slurry of scaling compounds present to sponge up any supersaturation. Also, the equipment required is relatively inexpensive.

Operate 60-70 Hours

Evaporators so equipped can concentrate acid continuously for 60-70 hours. This is normally followed by an 8-12 hour wash which consists of boiling water at a reduced rate under vacuum. Since there is accumulated sludge in the equipment at start of cleaning cycle, the solution used during boil-out should be acidic, such as a 5% sulfuric solution.

With the new system, evaporator tube plugging and scaling has been greatly reduced. Units have been reported operating for over two years without experiencing any tube troubles of this sort. The ring-gasket method for carbon tube attachment has worked out well. One to two years service with top ring gaskets is common. Gaskets on bottom tubesheet frequently last longer. So far as can be determined, lead seems to resist corrosion almost indefinitely in this service.

Compared to earlier evaporators and alternate methods of concentrating phosphoric acid, the new equipment is easy to operate, low in maintenance, readily adapted to instrumentation. It permits recovery of fluorine byproducts and has negligible entrainment losses.

(Further information about phosphoric acid evaporators may be obtained from Swenson Evaporator Company, Division of Whiting Corporation, Harvey, Illinois.)

Check 3322 opposite last page.

SOLVED WITH DICALITE FILLERS

NEW MATERIALS INCREASE RANGE OF APPLICATIONS

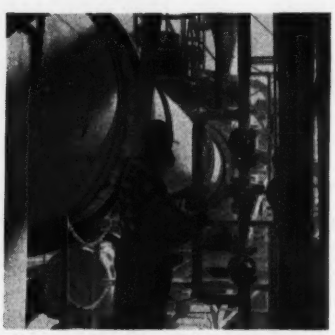
Dicalite has added new products to its family of filler materials, as well as new quality control measures. Now, diatomite, perlite and carbon-based materials are available to meet industry's widest range of filler applications.

Because of their unique particle structure and their physical and chemical properties, Dicalite filler materials are used in a tremendous variety of ways—in paint, paper, rubber, plastics, resins, cements, fertilizers, insecticides, horticultural mediums, as catalyst carriers, absorbents, etc.

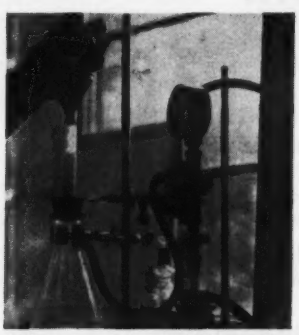
They offer tremendous surface area and porosity, great bulk in relation to weight, high absorptiveness, and structural reinforcement in many uses. All are chemically and physically stable in practically all applications. Diatomite is used in many high temperature insulations; perlite is especially effective in cryogenic applications.

Dicalite filler materials may provide an answer to your filler problem. Call the Dicalite man and see.

Careful strata selection provides the best crude for each product's final requirements.



New processing refinements, including special calcining methods, control product characteristics with an accuracy never before possible in any plant.



With more than 22,000 quality control tests every month, the Dicalite plant laboratories hold every product grade to rigid specifications.

New automatically-controlled packing and pressure-palletizing is the final step in efficient modern operation.

Dicalite®
Dicalite Department
Great Lakes Carbon Corporation
612 So. Flower Street, Los Angeles 17, Calif.

I am interested in these aspects of filler materials
☐ Bulking ☐ Structural ☐ Extender ☐ Carrier ☐ Insulation
Type of product or material _____
☐ Send information ☐ Have Dicalite man phone for appointment
NAME _____
TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ PROV. _____
CP-2

Check 3321 opposite last page.

"NATIONAL" PERFORATED APRON CONVEYOR DRYER

Evidence of the outstanding efficiency and economy of this "National" drying unit is found in the number of existing and on-order installations among the Nation's leading chemical manufacturers.

Increased drying capacity per square foot of surface; improved uniformity of dried product; much easier apron cleaning; greater efficiency and accessibility of gas or steam heaters; and a generally neater machine to operate and maintain, are characteristics of this drying system resulting from unique and exclusive features of "National" design, construction, operation and control.

The same type of dryer is used by the Nation's leading manufacturers of synthetic fibres.

The following well-known companies are among the current users of "National" Perforated Apron Conveyor Dryers:

AMERICAN VISCOSE CORPORATION
ARMOUR & COMPANY
THE PHILIP CAREY MANUFACTURING CO.
DAVISON CHEMICAL COMPANY, DIV. OF W. R. GRACE & CO.
DU PONT COMPANY OF CANADA (1956) LTD.
E. I. du PONT de NEMOURS & CO.
THE GENERAL TIRE & RUBBER CO.
CONGOLEUM-NAIRN, INC.
O. M. SCOTT & SONS CO.
A. E. STALEY MANUFACTURING CO.
AMERICAN ENKA CORP.
NATIONAL ANILINE DIVISION, ALLIED CHEMICAL & DYE CORP.
NATIONAL METAL EDGE BOX CO.
CANADIAN INDUSTRIES, LTD.
RADIO CORPORATION OF AMERICA
THE DOW CHEMICAL CORP.
CHEMSTRAND CORP.
UNION CARBIDE & CARBON CORP.

Write for Literature Describing These "National" Dryers and Typical Installations.

THE NATIONAL DRYING MACHINERY COMPANY
LEHIGH AVE. and HANCOCK ST., PHILADELPHIA 33, PA.

New England Agent: JONES & HUNT, INC., Gloucester, Mass. Cable Address: "NADRYMA"—W.U. Code

Check 3323 opposite last page.

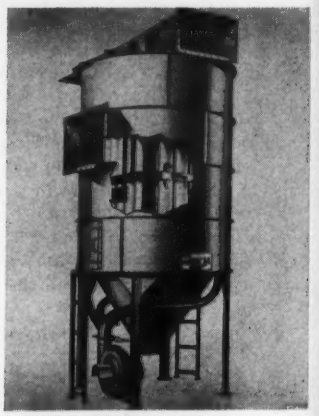
No hoses required on reverse-jet dust-collector

Ups bag cleaning efficiency, reduces maintenance

Uses: Recovering wide variety of dry materials in chemical, pharmaceutical, food and allied industries.

Features: Reverse-jet air cleaning mechanism operates without use of flexible rubber hose, reducing maintenance and expense.

Description: Machine is designed to fill need for low cost, constant-volume fabric-type dust collector. Unit may be shipped in small sections and assembled at site, if desired.



Efficient bag cleaning system results in a nearly constant pressure drop being maintained across dust collector

In operation, dust-laden air is either drawn or blown into inlet plenum at top. Dust then passes into the 9" diam filter bags through venturi-shaped inlet. Most of particles drop to conical hopper at bottom of each bag.

Very fine dust clings against inside of bags. Dislodging is accomplished by reverse-jet air.

Air is supplied by externally-located blower which is connected to vertical air supply columns. High pressure air is introduced into the columns by a moving shoe which enters two tight neoprene rubber flaps mounted vertically in open side of the air

column. The design bypasses need for flexible rubber hoses and eliminates hose wear problems. It also acts as guide for the up-and-down path of the complete cleaning assembly.

Actual cleaning of the bags is done by air blown through annular orifices of jet rings surrounding the bags. Chains are used to raise and lower the cleaning assembly. Drive mechanism for the unit is mounted on top of the collector.

Dust collectors are available in six sizes ranging from nine to 45 bags. Largest unit has 10½′ diam and is about 34′ high. Smallest unit is about 5¾′ diam and 10½′ high.

(Model-B Amerjet fabric dust collector is product of American Air Filter Company, Inc., 215 Central Ave., Louisville 8, Kentucky.)

Check 3324 opposite last page.

Stainless steel, plastic brine-making apparatus introduced by firm

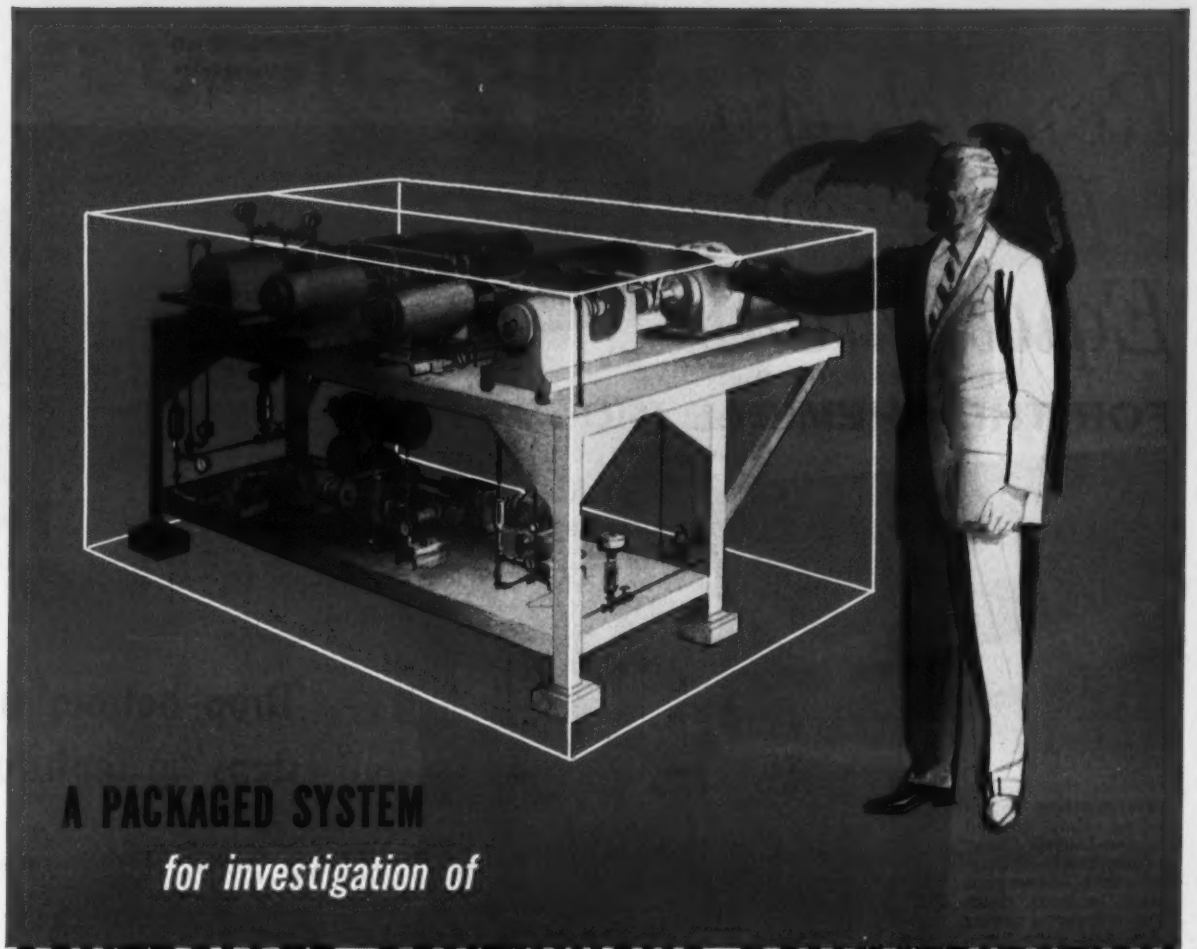
Two new brine-making machines have been announced by a salt producer. The first, Model E-S, is made of low-carbon stainless steel. Fittings are of stainless steel or brine-inert plastic for long life and easy maintenance.

The other, Model E-P, is an all-plastic unit. Material is approved by Meat Inspection Bureau and meets sanitary standards. The unit is lightweight and translucent. Latter permits observation of salt supply and liquid level through the tank wall.

(Further information about brinemakers may be obtained from Morton Salt Company, 110 North Wacker Drive, Chicago 6, Ill.)

Check 3325 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.



A PACKAGED SYSTEM
for investigation of
CONTROLLED CONTINUOUS POLYMERIZATION

VOTATOR* processing equipment is used for continuous polymerization reactions in numerous installations. It affords fast, efficient, controlled processing not possible in batch reactors.

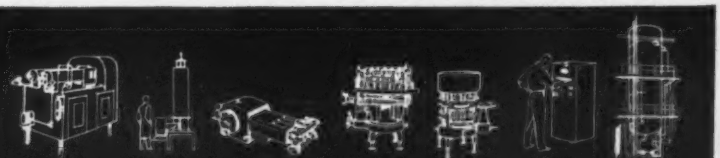
Girdler's experienced engineers operate extensive pilot facilities to provide exact specifications for scaling up to production equipment. VOTATOR engineered systems are designed to meet your own specific process requirements. These systems provide a high degree of flexibility and versatility. They save materials, use less floor space and assure significant overall operating economy.

Rugged, dependable VOTATOR continuous reactors are fabricated by skilled craftsmen in strict compliance with ASME codes. Materials of construction are carefully selected according to the properties of products processed.

Packaged VOTATOR pilot systems are now available for studies of continuous reaction processes in your plant. For additional information write Girdler Process Equipment Division, P.O. Box 43, Louisville 1, Kentucky.

*VOTATOR—Reg. U. S. Pat. Off.

GIRDLER PROCESS EQUIPMENT DIVISION
CHEMETRON CORPORATION
Louisville 1, Kentucky
CHEMETRON



VOTATOR CONTINUOUS PROCESSING EQUIPMENT FOR CHEMICAL & FOOD INDUSTRIES · VOTATOR PISTON & GRAVITY FILLERS · VOTATOR PLANTS FOR FATTY OILS INDUSTRY · THERMEX DIELECTRIC HEATING EQUIPMENT

Check 3326 opposite last page.

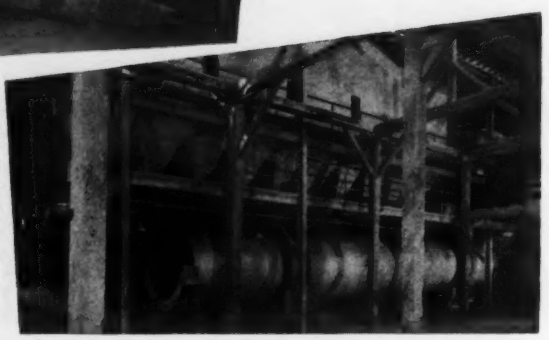
Renneburg Processing Equipment

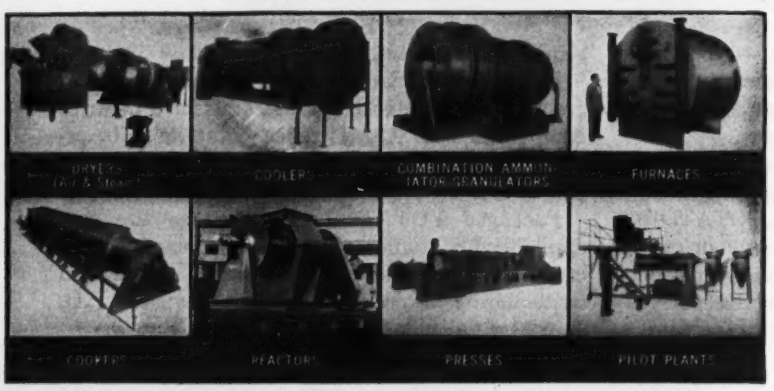
Serving the Process Industries for Over 85 Years

FOR THE CHEMICAL INDUSTRY

RENNEBURG 24 million BTU/Hr capacity Refractoryless Furnace—used with 8′ dia. x 60′ Dryer (left), parallel with 8′ x 60′ Counter-Current Cooler.

RENNEBURG Rotary Drying Unit (behind Counter-Current Cooler in foreground)—Equipped with 5-compartment insulated cloth-type collectors, having orlon dust tube filters for effective air pollution control.





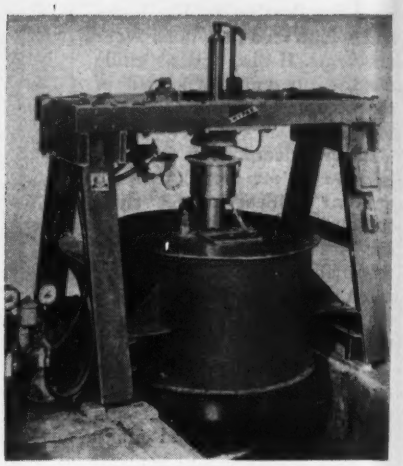
KILNS • COMBUSTION EQUIPMENT • CALCINERS • FANS • COLLECTORS
AIR POLLUTION CONTROL SYSTEMS • AMMONIATORS* • GRANULATORS*
PUG MILLS • EVAPORATORS • MIXERS • ELEVATORS • CONVEYORS • ROASTERS
*TVA Licensed Manufacturer

Literature and information on request

EDW. RENNEBURG & SONS
2639 BOSTON STREET, BALTIMORE 24, MD.

Check 3327 opposite last page.

PROCESSING EQUIPMENT



Absence of knife, scraper or scoop-type unloaders permit centrifugal to process crystalline materials with minimum breakage

'Drop-bottom' unloading steps up centrifuge cycle

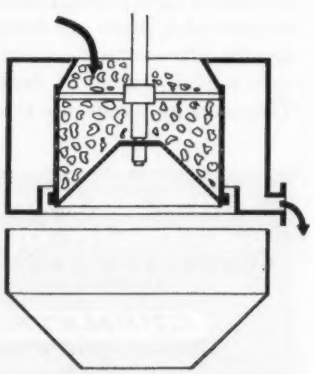
No mechanical unloader needed; little chance for crystal breakage

USES: Separating liquids from solids in chemical, food and allied industries.

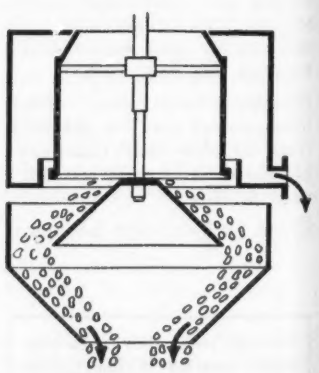
Features: Fast, automatic discharge of solids is accomplished without use of complicated unloading mechanisms. Simplified design results in lower equipment and maintenance costs. Absence of knife, scraper or scoop-type unloaders practically eliminates breakage and pulverization experienced when processing crystalline products in conventional centrifuges.

Description: Centrifugal can be adapted to any required degree of automation. Machine may be loaded either while it is operating or shut down.

Discharge of solids is con-



LOADING — Cone-shaped basket is in closed position. Liquid portion exits through side port



DISCHARGE — Cake drops out when basket is lowered

ducted through bottom of unit. Cone-shaped basket simply lowers into open position, causing cake to fall out (see drawings). Emptying bulky products is no problem since discharge opening may be adjusted to expose full inside width of basket.

Centrifugals can be manufactured from various materials of construction and in wide range of capacities. In addition to use in chemical and food fields, units have found application in textile reclamation and difficult metal separation processes.

(Further information about Hypar Model SCD centrifugal may be obtained from American Tool and Machine Co., Hyde Park Ave., Boston, Massachusetts.)

Check 3328 opposite last page.

Wedge-wire screens boast high capacity and long life

Slit widths available as small as 0.002"

Uses: Screening, sifting, dewatering, sizing, washing and filtering products in chemical and allied fields.

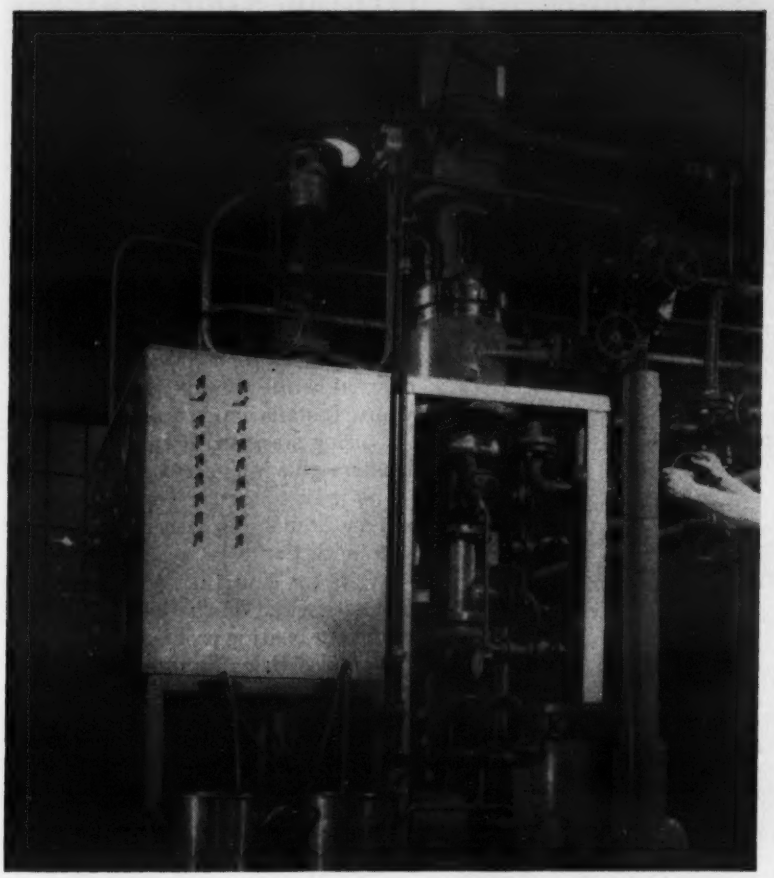
Features: High, narrow profile of wedge-wire permits

Wedge-wire screen has high capacity, is self-cleaning

large number of wires per area of working screen surface. Increased percentage of open space boosts screening capacity.

Description: Screens are made of stainless and carbon steels. Units are furnished in rectangular, oblique angled, round and oval beds with sharp or round bends. Conical segments, cylindrical troughs

FLUIDICS* AT WORK



Facts about the WIPED FILM evaporator

Difficult evaporations include (1) heat-sensitive, (2) highly viscous and (3) low-thermal-conductivity products. The Pfaudler Wiped Film Evaporator is designed for use with such products.

One of its unique features is a *mechanically wiped* evaporating surface.

How it operates

Centrifugal force of an internal rotor holds four free-floating wipers in contact with the evaporator wall. Wipers spread out your product over the entire evaporating surface in a *thin uniform* film. Slots in each wiper prevent product "curl" forward of the wipers and accelerate product down the wall.

Complete wetting of the heated wall achieves maximum heat transfer.

Low rotor speeds (90-120 rpm) provide sufficient centrifugal force for positive wiper contact.

Features

- Wipers assure short contact time on heated surface for sensitive materials.
- Moves even viscous liquids easily through unit.
- Promotes formation of a thin film for efficient heat transfer on low-thermal-conductivity products.

Test and Production Units

A 4-square-foot Wiped Film Evaporator is maintained in the Pfaudler Test Center for product evaluation studies.

Standard units available offer 4 to 100 square feet of evaporating area.

For further specifications or for details of a test program, write our Pfaudler Division, Dept. CP-70, Rochester 3, New York.

Why and how to get a combination heat exchanger

Suppose you want to concentrate sulphuric or nitric acid on the tube side, using high pressure steam on the shell side. What kind of heat exchanger would you select?

Faced with this problem, our answer was a *combination*—bonnets of Glasteel, tubes and tube sheet of tantalum, and a shell of carbon steel, as illustrated above.

CHOICE OF MATERIALS. This combining materials of construction is something we are in a unique position to handle. For example, from Pfaudler you can get components made from stainless, GLASTEEL, nickel, Inconel, Monel, Hastelloy, and impervious graphite.

And now you can even get the special characteristics of components fabricated by us from titanium, tantalum, and zirconium.

OPTIMUM DESIGN. The intent of combining materials is to provide the optimum design in terms of heat transfer efficiency and corrosion resistance at the *lowest cost*.

Since our background and facilities cover this wide choice, you are sure that your needs are met with complete objectivity. Your product, your process, and your budget will point the way.

YOU'RE INVITED. What it ends up with is this invitation: Consult with us on your problem. We will then submit our recommendation on the right combination. Or get more background from our Bulletin No. 949.

BUYERS' GUIDE. Outlines our FLUIDICS program in terms of services and products for corrosioneering, water treatment, storage, agitation, etc. Send for your free copy.

FLUIDICS AROUND THE WORLD

Pfaudler Permutit is a world-wide company with manufacturing plants in:
Germany: Pfaudler-Werke A.G.
Great Britain: Enamelled Metal Products Corp. Ltd.
Canada: Ideal Welding Co. Ltd.
Mexico: Arteacero-Pfaudler, S.A.
Japan: Shinko-Pfaudler Co., Ltd.
as well as four plants in the U.S.A.

*FLUIDICS is the Pfaudler Permutit program that integrates knowledge, equipment and experience in solving problems involving fluids.

PFAUDLER PERMUTIT INC.
Specialists in FLUIDICS . . . the science of fluid processes

Check 3329 opposite last page.

CHROMALOX
FIRST NAME IN ELECTRIC HEAT
Embossing press converted to electric heat.
Curved to match circumference of round pipe.
Mounted on side of dip tank.
Two heater groups, separately controlled for zoned heat.

CHROMALOX

ELECTRIC STRIP HEATERS

QUICK, LOW-COST SOLUTION TO PRODUCTION HEATING PROBLEMS

For heating tanks, kettles, pipes, platens, dies, ovens . . . just about anything. Chromalox Electric Strip Heaters provide uniform heat to exact temperatures.

Heaters available in shapes, sizes and wattages to fit hundreds of industrial heating needs . . . including yours. Installation is quick and easy . . . using standard bolts or clamps. Heaters give long service with little or no maintenance. Temperatures are maintained by either manual or automatic controls.

Write for Bulletin PA100. Or, for fast action and on-the-job assistance with your heating problems, call your Chromalox Sales Engineering Representative listed below. 01004

Call Your Chromalox Man for Heating Answers

ALBANY, N.Y. Hobart 3-0626
ATLANTA, GA. Trinity 5-7244
BALA-CYNWYD, PA. Mohawk 4-6113 Greenwood 3-4477
BALTIMORE, MD. Hopkins 7-3280
BLOOMFIELD, N.J. Edison 8-6900 New York: Worth 4-2990
BOSTON, MASS. Liberty 2-1941
BUFFALO, N.Y. Summer 4000
CHARLOTTE, N.C. Edison 4-4244 Franklin 5-1044
CHATTANOOGA, TENN. Amherst 5-3862
CHICAGO, ILL. Harrison 7-5464
CINCINNATI, OHIO Trinity 1-0605
CLEARWATER, FLA. Phone 3-7706
CLEVELAND, OHIO Prospect 1-7112
COLUMBUS, OHIO Amherst 7-8260
DALLAS, TEX. Riverside 8-9004
DAVENPORT, IOWA Phone: 6-5233
DENVER, COLO. Glendale 5-3651 Genesee 3-0821
DES MOINES, IOWA Cherry 3-1203
DETROIT, MICH. (See Southfield, Mich.)
HOUSTON, TEX. Capitol 5-0356
INDIANAPOLIS, IND. Melrose 5-5313
KANSAS CITY, MO. Victor 2-3306
LOS ANGELES, CAL. Richmond 7-5191
MIDDLETOWN, CONN. Diamond 6-9606
MILWAUKEE, WIS. Broadway 1-3021
MINNEAPOLIS, MINN. Federal 6-6631
NASHVILLE, TENN. Cypress 2-7016
NEW YORK CITY, N.Y. (See Bloomfield, N.J.)
OMAHA, NEB. Atlantic 7600
PHILADELPHIA, PA. (See Bala-Cynwyd, Pa.)
PITTSBURGH, PA. Emerson 1-2900
PORTLAND, ORE. Capitol 3-4197
RICHMOND, VA. Atlantic 8-8758
ROCHESTER, N.Y. Hamilton 6-2070
ST. LOUIS, MO. Chestnut 1-2433
SAN FRANCISCO, CALIF. Underhill 1-3527
SEATTLE, WASH. Main 4-7297
SOUTHFIELD, MICH. Kenwood 8-2100 Elgin 7-0677
SYRACUSE, N.Y. Granite 4-3933
WICHITA, KAN. Amherst 2-5647

EDWIN L. WIEGAND COMPANY
7500 Thomas Boulevard • Pittsburgh 8, Pa.
CHurchill 2-6400

Check 3330 opposite last page.

and other shapes are available.

Screen wires are manufactured in several profiles, including slanting tapered, tapered, flanged and diamond. Profiles minimize blinding and clogging because any particle that passes top surface will clear entire opening.

Spacing lugs provide rigidity in the screen. Slit widths down to 0.002" are available.

(Further information about Rima screens may be obtained from Cross Perforated Metals Plant, National-Standard Company, Carbondale, Pa.)

Check 3331 opposite last page.

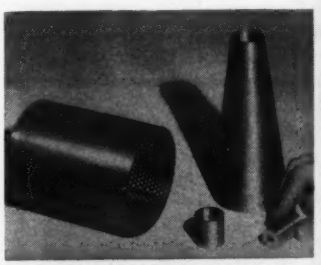
Porous metal elements have high strength, accurate pore size

Can be made of any metal that draws into wire

Uses: Filtering fluids.

Features: Low-cost porous metal elements can be produced as cylinders, cones or other geometrical figures. Pore size ratings are 10 and 20 microns nominal and 25 and 50 microns absolute.

Description: Units are made by winding stranded and solid wires, side by side and layer on layer. Furnaces sinter



Porous metal filter elements can be made up to 120" long, 48" in diam

wires together at all contact points. Open areas between solid wires and strands form the pores.

Elements can be produced with dimensions ranging up to 120" long and 40" in diam. Units have high axial compression strength, burst strength and modulus of elasticity. Elements can be manufactured

from almost any metal that can be drawn into fine wire. With molybdenum, units can withstand up to 4500°F.

(Porostrand wound-wire porous metals are product of Bendix Filter Division, Bendix Aviation Corporation, 434 W. 12 Mile Rd., Madison Heights, Michigan.)

Check 3332 opposite last page.

Fast, uniform blending with self-supported resin mixer

Disc-type blade shears and disperses product

Uses: Resin blending.

Features: Disc-type blade shears and disperses solid materials rapidly with minimum of air entrapment.

Description: Drum-type resin mixer is self-contained and self-supporting. Designed for fast, efficient resin blending, unit is available in 3, 5

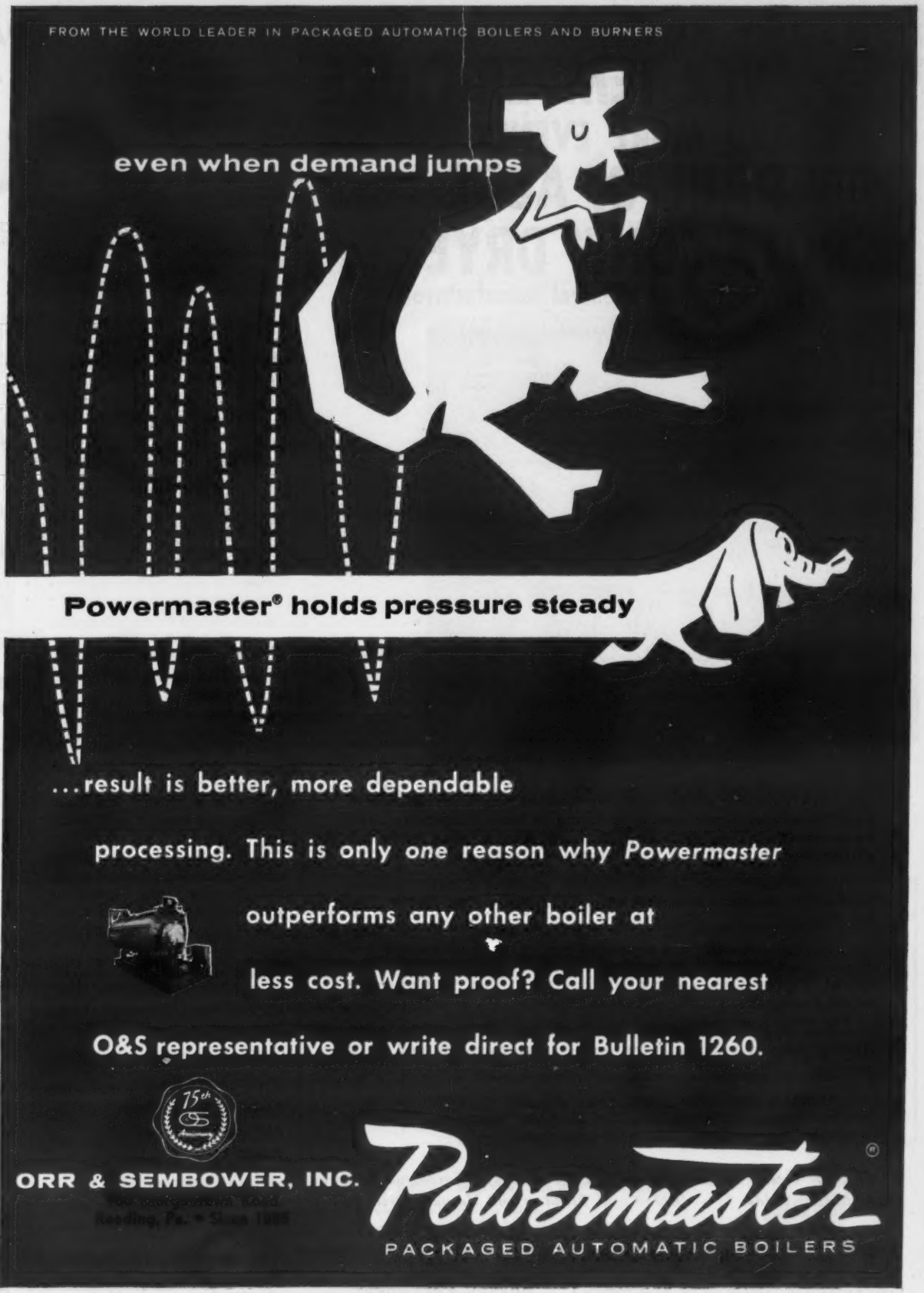
Low-cost, drum-type resin mixture is self-contained and self-supporting

and 7½ horsepower sizes. Disc diameters are 6, 9 and 12" diameter. Counter-balanced motor can be cranked up or down for easy loadings.

In operation, angled blade imparts bottom-to-top motion in the resin. Dead spots are eliminated, resulting in uniform mix. Low heat buildup minimizes "kick over" hazard.

(Further information about resin mixer may be obtained from Drake Corporation, Grand Haven, Michigan.)

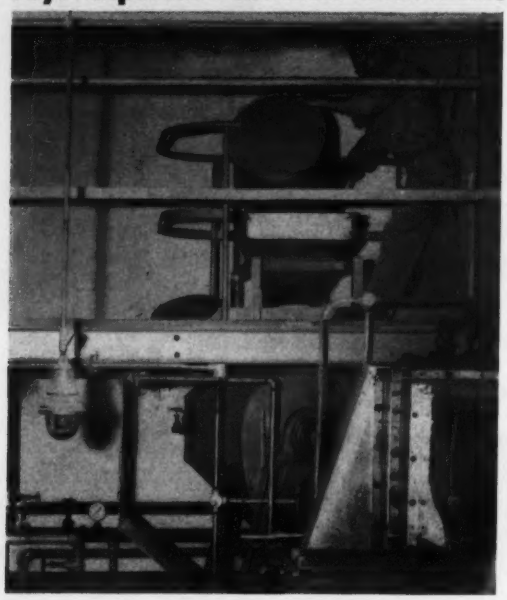
Check 3333 opposite last page.


FROM THE WORLD LEADER IN PACKAGED AUTOMATIC BOILERS AND BURNERS
even when demand jumps
Powermaster® holds pressure steady
...result is better, more dependable
processing. This is only one reason why Powermaster
outperforms any other boiler at
less cost. Want proof? Call your nearest
O&S representative or write direct for Bulletin 1260.
75th
ORR & SEMBOWER, INC.
Reading, Pa. • Since 1885
Powermaster®
PACKAGED AUTOMATIC BOILERS

Check 3334 opposite last page.

"WE DRY AT LOWER TEMPERATURE AND MORE EVENLY WITH PAUL O. ABBE' 'ROTA-CONE' DRYER"

— says important chemical manufacturer.



"The tumbling action in drying our heat-sensitive materials in your 'Rota-Cone' Dryer assures us drying at lower temperatures and more evenly, since it gives contact of the material with the heated surface, and the vacuum removes the moisture-laden air.

"Incidentally, this tumbling action produces a more uniform product by providing a mixing action at the same time that it dries the material."

The concern using this dryer also reports other advantages over tray drying: Less exposure to dirt, less space, and 1/3 less labor required. Temperatures automatically controlled from 30° Centigrade to 90° Centigrade.

The "Rota-Cone" Dryer is used for plastic resins, chemical powders in flake or granular form, textiles, pharmaceutical and metal powders.

Avoid higher labor costs, dirt, and decomposition of heat-sensitive materials. Switch to a Paul O. Abbé "Rota-Cone" Dryer—available in capacities from 1 to 500 cubic feet.

For full details of this equipment, write today for our 12-page illustrated "Folder C — 'Rota-Cone' Blenders and Vacuum Dryers."

PAUL O. ABBE

402 CENTER AVE. LITTLE FALLS, NEW JERSEY

BALL & PEBBLE MILLS
DRY & PASTE MIXERS
DRYERS & BLENDERS

Check 3335 opposite last page.

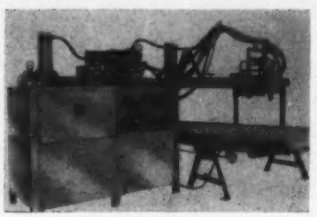
PROCESSING EQUIPMENT

Automatic foam machines process from 50 grams to 175 lb per min

Uses: Producing polyether, polyester, dimer base or halogenated hydrocarbon self-blown foams, either flexible, rigid or semi-rigid.

Features: Standard units can handle viscosities up to 20,000 cp. Machines are available in capacities ranging from 50 grams to 175 lb per min.

Description: Automatic foam machines are designed for intermittent or continuous operation. Mixing head includes automatic flush and air jet for easy cleaning.



Mixes with viscosities up to 20,000 cp can be handled by automatic foam machine

Metering is done by positive displacement pumps. Each pump is driven by variable-speed drive and includes tachometer. By adjusting rpm, any ratio or proportion may be obtained from 1 to 1 or 50 to 1.

Feed tanks and covers are made of welded stainless steel. Vessels are fully insulated and electrically heated. Contents may be automatically controlled from 50 to 350°F.

(Foam machines are product of Gabriel Williams Co., Inc., 77 Mill Road, Freeport, L. I., New York.)

Check 3336 opposite last page.

Single-roll crusher reduces 16" feed down to 1/4"

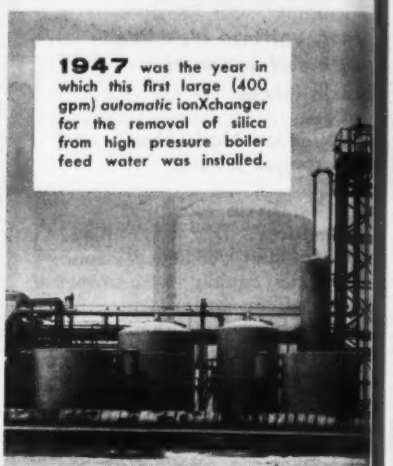
Uses: Chopping and delumping chemicals, plastics, pharmaceuticals and similar materials.

Features: Heavy-duty machine is constructed entirely of stainless steel. Unit can handle 16" feed. Final product

PATHWAYS OF A PIONEER

ILLCO-WAY DESIGNERS AND BUILDERS

MODERN EQUIPMENT FOR ionXchange


1947 was the year in which this first large (400 gpm) automatic ionXchanger for the removal of silica from high pressure boiler feed water was installed.

Blazing the Way for De-I Developments

Again we bring you an example of how IWT has always been in the forefront of the development of practical and successful ion-exchange equipment. The big boiler-water de-ionizer shown above is now more than 12 years old, is still in operation, and has been joined by two more IWT units of similar size in this sprawling midwestern chemical plant. Many other early users of ILLCO-WAY ionXchange have since *added to* and *modernized* their installations as new developments became available.

The pioneering work which IWT started in 1937, with the advent of the first commercial ionXchange resins, is still being carried on — for the benefit of present users of IWT equipment, as well as future customers. New ideas, new processes, new resins, new methods of construction, new materials, new parts and accessories — all these are under constant consideration from the foundation of long experience and with the zeal of the forward look.

THIS EXPERIENCE CAN MEAN A LOT TO YOU

If you need pure water for high-pressure boiler make-up or process use, or if you are considering the use of ion-exchange for purification or concentration of chemical products, be sure to take advantage of IWT pioneering experience and specialized knowledge. *Call your IWT representative.*

ILLINOIS WATER TREATMENT CO.
840 CEDAR ST., ROCKFORD, ILLINOIS
NEW YORK OFFICE: 111 E. 38th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Systems, Ltd., London, Ont.

Check 3337 opposite last page.

size may be controlled between ¼ to 4".

Description: Chopping and delumping mechanism consists of slowly revolving roll on which a large number of replaceable, non-swinging teeth are fastened. Many types

Heavy-duty crusher can handle hard, soft, brittle, granular, gummy or resinous materials

and sizes of teeth are available including pick, hatchet, hammer and anti-clog designs.

Tooth angle is such that chunks of any size up to full hopper dimension (16 x 16") may be chopped. Final reduction and sizing occurs as teeth trap oversized pieces against comb at bottom of unit.

Machine can be supplied with five to 10 ph motor. Crusher weighs approximately 1200 lb.

(Stainless steel delumper No. 1075B is product of Franklin P. Miller & Son, Inc., 36 Meadow St., East Orange 2, New Jersey.)

Check 3338 opposite last page.

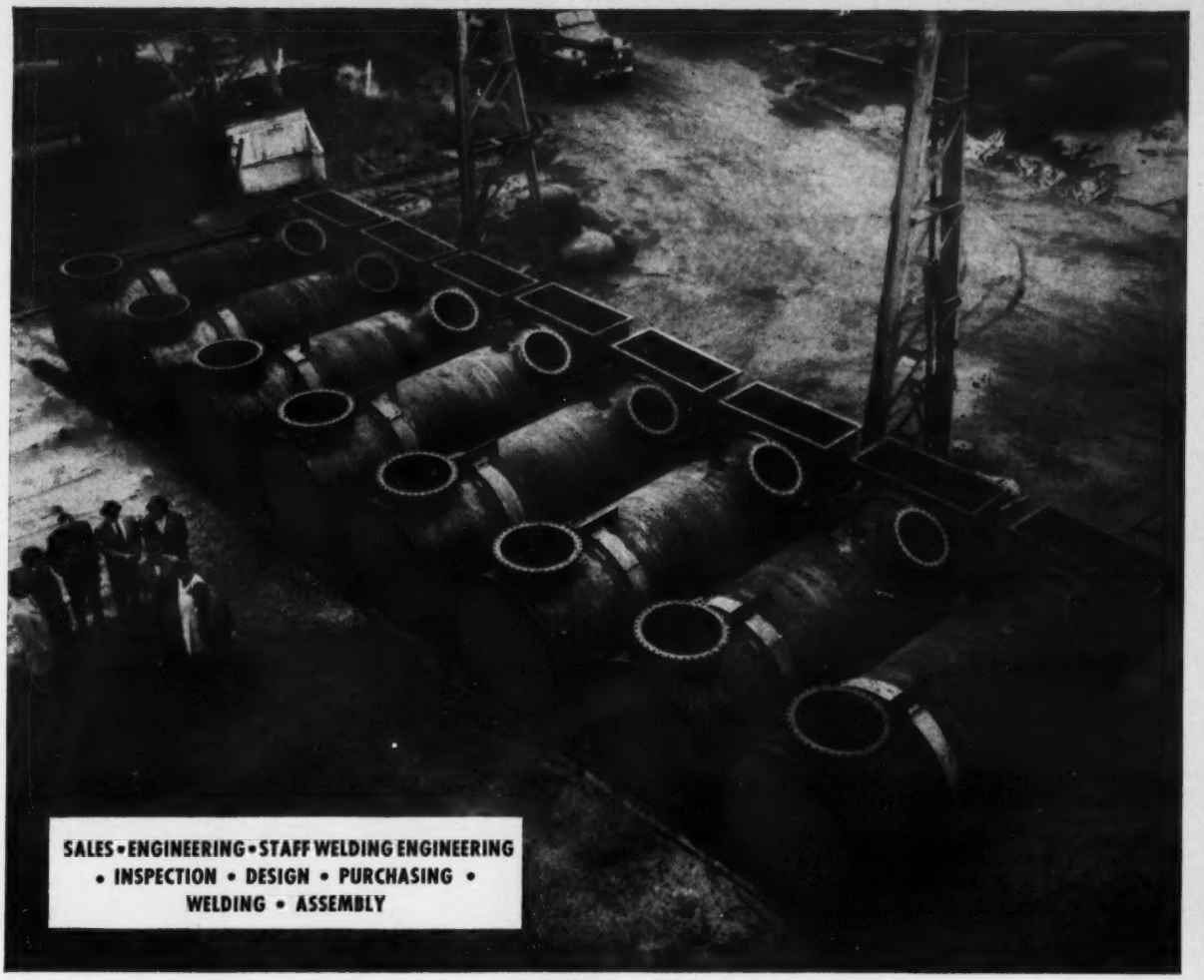
No complicated valves or other assemblies on vacuum filter

Simplifies maintenance and cuts costs

Uses: Filtering chemicals, pulp, sewage, ores and other materials.

Features: Filter requires no complicated valves, agitators or special assemblies. Entire filtration cycle from feed to filter cake discharge is visible.

Description: Filter has high capacity and occupies minimum head room and floor space. Designed for continuous operation, unit has sec-



We're all on the quality control team at Downingtown Iron Works

Yes, when you place heat exchanger orders with Downingtown, every department of the company contributes to quality construction of the units you need. Every man makes quality control his business—whether he's in sales, engineering, design, purchasing, welding, assembly or inspection. Write for helpful bulletins on heat exchanger design.

UNIT SPECIFICATIONS

Here are specification details for one of the units pictured above:

Size:	72" diameter by 16'0" tube length
Tubes:	1406—1¼ O.D. x 12 BWG
Tube Material:	SA213 Grade T-12 (Chrome Moly Steel)
Tube Sheets:	2⅜" thick SA387 Gr. B Firebox Low Alloy Steel
	2¼" thick SA212 Gr. B Firebox Carbon Steel
Shell Material:	½" thick SA387 Gr. B Firebox Low Alloy Steel
	½" thick SA204 Gr. B Firebox Low Alloy Steel
	½" thick SA285 Gr. C Firebox Carbon Steel
Baffles:	½" thick Type 502 Stainless Steel
Expansion Joint:	6' diameter, triple corrugation, bellows type
Design Conditions:	14 psi @ 1000° Fahrenheit
Weight:	47,000 lb. each

All tubes are seal welded at both ends.

Downingtown Iron Works, Inc.

144 Wallace Ave., Downingtown, Pennsylvania
division of PRESSED STEEL TANK COMPANY Milwaukee
Branch offices in principal cities

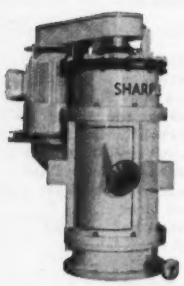
HEAT EXCHANGERS—STEEL AND ALLOY PLATE FABRICATION
CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

DOWNINGTOWN IRON WORKS Hackney

Check 3339 opposite last page.

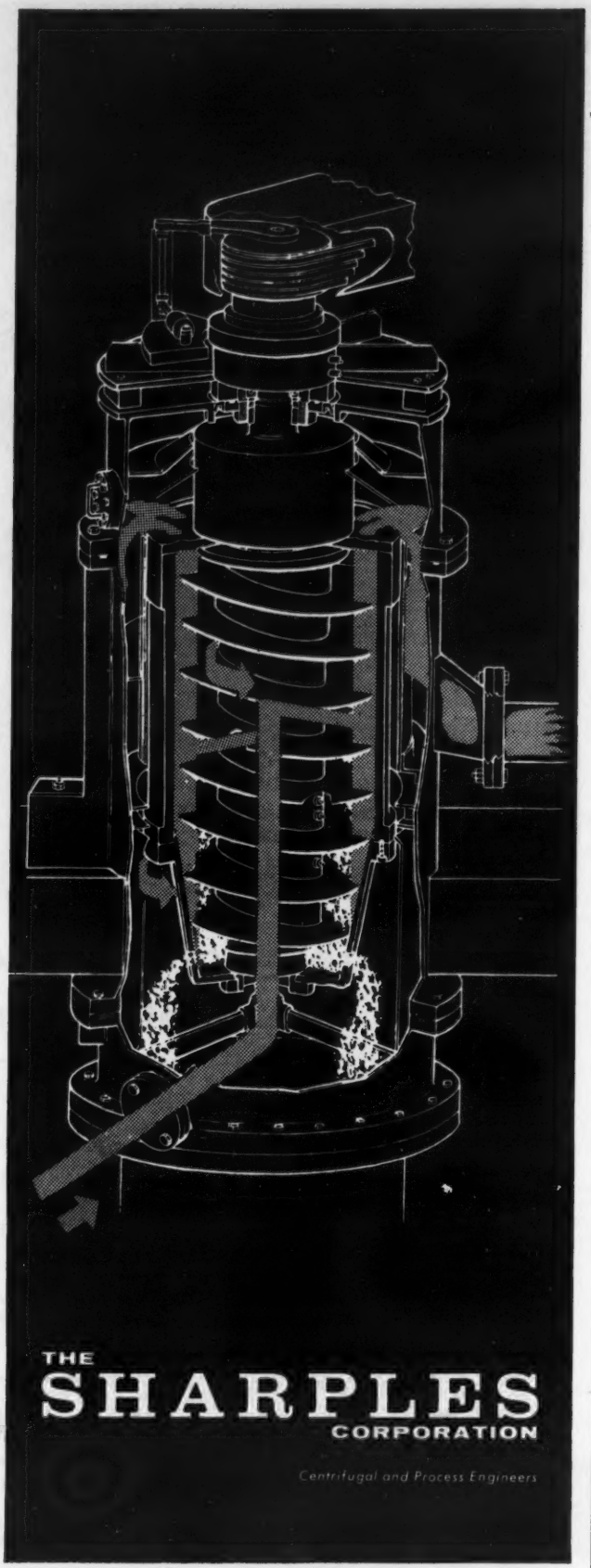
The P-4000 Super-D-Canter designed exclusively for Centrifugal Separation Under Pressure

- Simple mechanical sealing maintains pressure effectively.
- Gear box, seal, etc., are protected from contamination by process fluid.
- "Plumb bob" suspension minimizes foundation cost.
- External connections for feed, solids discharge, and liquid discharge are conventional flange connections.
- "Drop-through" solids discharge offers advantages in many applications.
- Built-in solids rinsing feature available.
- Performance characteristics:
  Capacity—liquids, 75+ gpm
  solids, 3+ tons/hour
  Operating Speed—4,000 rpm
  Centrifugal force—3,200 × G
  Pressure—to 15 psi (can be operated at atmospheric pressure)
  Particle Size—from a few microns up to ¼" or more depending on requirements.
  Solids concentration in feed—approx. ½ to 50%.
- The P-4000 Vertical Super-D-Canter offers many operating advantages not previously available. Write today for the new technical bulletin on this advanced design centrifuge by Sharples.



The vertical design of the Super-D-Canter makes it essentially "a bulge in a pressurized System".

• *Write for Bulletin 1287*

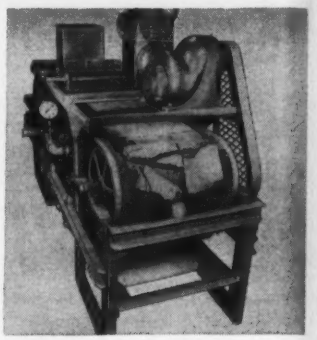


2300 WESTMORELAND STREET / PHILADELPHIA 40, PENNSYLVANIA
NEW YORK • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO
HOUSTON • SAN FRANCISCO • LOS ANGELES • ST. LOUIS • ATLANTA
Associated Companies and Representatives throughout the World

Check 3340 opposite last page.

tionalized drainage belt that permits good separation of filtrates.

Filter media is aligned at all times and may be washed on both sides continuously or intermittently. Cake is formed by combination of vacuum



Filter media on unit may be washed on both sides continuously or intermittently — minimizing blinding

and drainage. Cake is discharged by gravity. Countercurrent washing or leaching may also be used.

Maintenance costs are low because parts are visible and accessible. Filter belt can be removed and replaced in 30 minutes.

(Further information about filter may be obtained from Straight Line Filters, Inc., Box 291, Wilmington 99, Delaware.)

Check 3341 opposite last page.

"Murphy, I'd like you to meet Finkley, our new mechanical engineer."

THAT'S INTERESTING

Thirsty as a jet!

A modern turbojet engine consumes about 1 lb of fuel per hr for each pound of thrust. The B-58 "Hustler" with 4 turbojet engines burns 48,000 lb/hr.

Weather systemized

Meterological data is gathered automatically by system of 7 substations and sent to master station where it is recorded and printed.

Substations, each containing input devices, measure wind speed and direction, air temperature, relative humidity, radiation and barometric pressure. They are linked to master station by telephone lines and send data on demand.

Designed by Datex Corporation, system will be used by Sandia Corporation in operating radiation detection instruments in connection with an engineering reactor facility.

For more information on product at right, specify 3342 see information request blank opposite last page.

APPLYING TECHNOLOGY TO REDUCTION PROCESSING . . .

Take a look at the "works" of a MIKRO-PULVERIZER, and you'll have a pretty good idea why these units have been receiving the nod of approval from the processing industries for so many years. It's not just a "grinder" . . . but a precision-engineered unit in which each component is carefuly machined and balanced, held to close, uniform tolerances. And this is true of the entire MIKRO-PULVERIZER line, from the smallest pilot plant mill to units producing upwards of ten tons per hour! You'll find the Mikro Laboratories at your disposal, ready to test grind your product and help you select the unit for your particular requirements. As an additional assurance, we're set up to ship genuine Mikro replacement parts to you within 48 hours of order. Bulletin 51A has the full story of models and capacities. It's yours for the asking, with no obligation.

MIKRO-Products

SPAN THE GLOBE

PROCESSING SYSTEMS

GRINDING CONVEYING COLLECTING

Pulverizing Machinery Division • Metals Disintegrating Company, Inc.
60 Chatham Road • Summit, New Jersey

REPRESENTATIVES throughout the United States, Continental Europe, British Isles, Canada, Mexico, Central and South America, West Indies, South Africa, India, Japan, Philippines, Australia and New Zealand.
MANUFACTURING FACILITIES: United States, Canada, Continental Europe, British Isles.

Size and separate your materials the modern way with these rotary motion Simon-Carter machines

The *rotary* motion principles employed in Simon-Carter machines are far more efficient and accurate than flat surface screening methods. For length sizing or separating, pockets or indents are used. For thickness or width sizing or separating, perforated cylinders (*that stay clean*) are used. All machines are compact in relation to capacity, and are of all-metal construction. Write today for complete information and descriptive booklets. Free laboratory testing and demonstrating service.

CARTER SCALPERATOR
Coarse materials are carried over the top of a rotating wire mesh screen. Fine materials are drawn out by suction. The Carter Scalperator is used for cleaning material as it is shipped or received. Another all-rotary-motion machine.

CARTER PRECISION GRADER
Separates and sizes free-flowing granular materials by *thickness* and *width* differences.

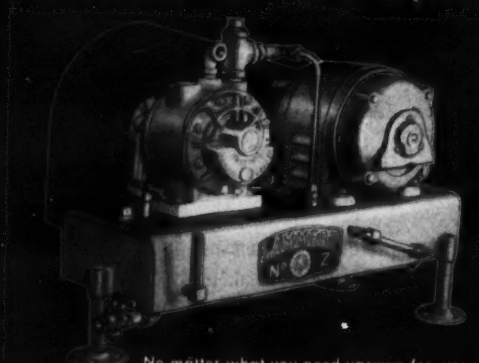
CARTER DISC SEPARATOR
Unexcelled for accurately separating and sizing free-flowing granular materials by *length* differences.

WRITE FOR COMPLETE INFORMATION

SIMON-CARTER CO.
677 19th Avenue N. E. • Minneapolis 18, Minnesota

Check 3343 opposite last page.

VACUUM
LAMMERT PUMPS



No matter what you need vacuum for, you will get dependable service from automatically lubricated Lammert pumps. Capacities—4.3 to 225 cubic feet per minute. From medium to high vacuum (up to 20 microns of barometer).

Write for catalog showing the complete line, including specifications, of Lammert pumps and compressors.

LAMMERT & MANN CO., INC.
1753 Walnut Street, Chicago 12, Illinois, SEeley 3-0383

Check 3344 opposite last page.

FOR THE **BIG SHAKE***
"World's Quietest Vibrators"

hopper cars
massive bunkers
large bins
silos
chutes
shake-outs

MOVES, FEEDS, SIFTS
sand
clay
coal
ore
other materials

VIBROLATOR®
VIBRATION INDUCERS

*VIBROLATOR CCVP-3000, the 6600-lb. impact vibrator — or one of its three smaller brothers — IS GUARANTEED TO DO YOUR JOB OR YOUR MONEY BACK.

Order from your distributor today, or write for complete catalog.

MARTIN ENGINEERING COMPANY
Largest Producer of Rotary Vibrators
155 Kemp Street, Neponset, Illinois

® VIBROLATOR is Martin Engineering's registered trade mark for vibration inducers and vibrator accessories.

Check 3345 opposite last page.

Infrared unit supplies from 150 to 3000 Btu per linear inch

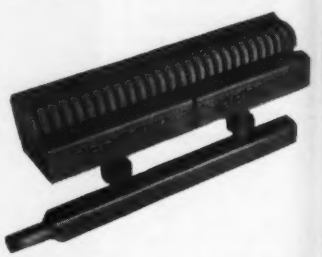
Reaches 2600°F, doesn't need combustion chamber

Uses: Supplying heat to dryers, ovens and conveyors.

Features: Burner does not require a combustion chamber. Flame is stable even under high velocity air circulation.

Description: Infrared gas burners are designed to provide from 150 to 3000 Btu per linear inch, depending upon gas-air mixture supply. Heat release is equivalent of from 45 to 900 watts per linear inch.

Combustion takes place completely within fluted refractory which attains operating temperatures to 2600°F when operated in the open. Two types of burners are available. One consists of an alloy for elevated temperatures. The other is made of cast gray iron for open applications. Lengths range from 7" to 100' or more.



Infrared gas burner provides low-cost, high radiation heat over wide temperature range

(High-radiation type H burners are product of Red-Ray Manufacturing Co., Inc., 318 Cliff Lane, Cliffside Park, New Jersey.)

Check 3346 opposite last page.

Heater exchanger catalog binder, containing 102 pages, comprising 13 separate bulletins describing shell-and-tube units is available. Literature is designed to help engineers and purchasing agents select and specify heat exchangers. Heat Exchanger binder catalog is available on company letterhead request to American-Standard Industrial Division, American Radiator & Standard Sanitary Corporation, Detroit 32, Michigan.

NEW LITERATURE

Processing Equipment

Entrainment separator modules, made of impervious graphite, are pictured and described in two-page bulletin. Designed for removing entrained liquids from corrosive gas streams, modules can be assembled to fit almost any duct or vessel. Cat Section S-6900—National Carbon Company, Division of Union Carbide Corporation.

Check 3347 opposite last page.

Tableting machines are described and illustrated in eight-page, three-color catalog. Pharmaceutical units such as mixers, granulators, drying ovens, and coating stands are also reviewed. "Pharmaceutical and Tableting Equipment"—Arthur Colton Company.

Check 3348 opposite last page.

Freedom From Dust is title of 28-page brochure that describes complete line of dust collecting equipment. Four case histories are included, telling how plants have benefited from use of the equipment. Bul 805 — Dracco Division of Fuller Company.

Check 3349 opposite last page.

Polyester plates and frames for filter presses are illustrated and described in two-page bulletin. Data is listed comparing weight, cost per plate, and cost per square foot of filtering area for seven different materials of construction. Bul 149 — T. Shriver & Company, Inc.

Check 3350 opposite last page.

Jet-action dust collector designed for recovering nuisance, noxious and high value dusts is reviewed in ten-page catalog. Drawings depict 12 applications taken from actual installations. Construction, design, and specifications for five standard units are shown. Bul 52A-1 — Mikro-Products, Pulverizing Machinery.

Check 3351 opposite last page.

Filtration of liquids and gases is topic of eight-page illustrated catalog. Full line of filters, and various kinds of filter media are described and illustrated. GEO-506A — Commercial Filters Corporation.

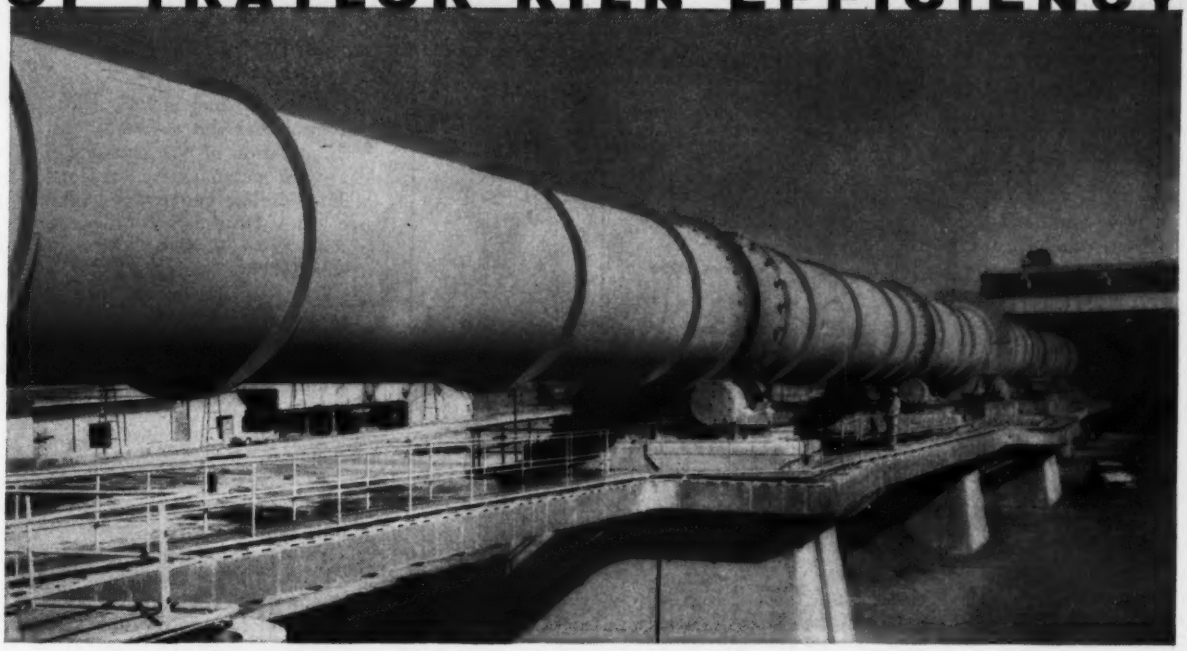
Check 3352 opposite last page.

Drying equipment for chemical, food and other industries are pictured and described in 18-page bulletin. Conveyor, spray, tray and truck dryers for continuous operations are included. Bul 448—Proctor & Schwartz, Inc.

Check 3353 opposite last page.

450 FEET

OF TRAYLOR KILN EFFICIENCY



Shown above is one of two 12′ x 450′ Traylor rotary kilns designed and built to meet the requirements of the Standard Lime and Cement Company, Martinsburg, West Virginia. Both are wet process kilns driven by dual drives with forged steel riding rings and forged steel supports. These kilns feature the Traylor-designed chain systems and dust return scoops. They are fed by a Traylor slurry feeder.

Write today outlining your kiln requirements and let our engineers make recommendations . . . or write for Bulletin No. 1115.

TRAYLOR ENGINEERING & MANUFACTURING

DIVISION OF FULLER COMPANY

1552 MILL ST., ALLENTOWN, PA.

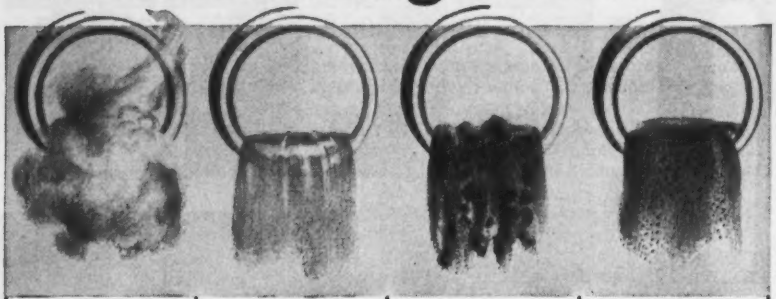
Sales Offices: New York — Chicago — San Francisco

Canadian Mfr.: Canadian Vickers, Ltd., Montreal, P.Q.

TKA-8

Check 3354 opposite last page.

Waste Handling...*Presolved!*



Gases and Vapors	Clear Liquids	Slurries	Solids and Semi-solids
Waste and toxic gases • vapor recovery and recondensation • vacuum distillation • gas blowing • refrigerants • low vacuum	Surface drainage • tank car unloading • process wastes • viscous liquids • acids: sulphuric, hydrochloric, acetic • spent caustic brine • cyanides • tank farm drainage	Liquids with ashes, fly ash, cinders, coal particles, catalysts, coke, sand, glass • tar • paint • pigments • adhesives • abrasives • molten sulphur • cane juice • black liquor	Heavy, bulky, dry materials • acid slurries • sand • ashes • powdered coal • cracking catalysts • sludges • pulp
Air Cooled Units	Submersible Pumps	Series 8000	Transporter
Fan Cooled Units	Series 3000	Series 6000	Expelsor®
Water Cooled Units	Unique Designs	Shone® Ejectors	Package Shone®
		Pneu-Pumps	

Right now you may be puzzling over a particular waste handling job—which type of pump to use and whether pneumatic or electric; corrosion problems; reclaimable materials; precautions for hazardous wastes; and a dozen other considerations. **Handling wastes is tricky, takes a know-how all its own.**

For 61 years, Yeomans has been solving waste and drainage problems throughout industry. Once in a while, Yeomans engineers bump into a new twist, but usually the job is one that has been worked out time and again.

Chances are, your own problem is already solved. Why not contact your Yeomans engineer-representative and find out. He brings you a wealth of experience, plus types of equipment unique in the field. If you don't already know him, look in Sweet's Catalog or in the yellow pages of the telephone book under "Pumps."

YEOMANS

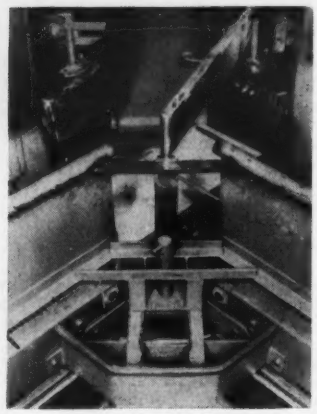
Pumps and Waste Treatment Equipment

P-5924 2003-5 N. Ruby St., Melrose Park, Illinois

Check 3355 opposite last page.

Y-type conveyor-packer doubles output

Two men fill and sew 100-lb bags at 16-per-minute pace



Swivel conveyor in use

Bagging and sewing production can be doubled with combination of two packers in Y-type arrangement of four flat-belt bag conveyors which enables two men to fill and sew up to 16 100-lb bpm of any flourlike material.

Key to system is swivel conveyor (see illustration) which automatically channels two bagging lines into single sewing line.

System consists of two GGG-38 automatic flour scales in duplex combination; G-23 packer beneath each scale; two bag conveyors — one beneath each packer — forming two upper arms of "Y". Leg of Y is sewing conveyor joined by swivel conveyor to bag conveyors.

Preset weight of material is discharged from weigh hopper by solenoid mechanism controlled by packer below. Timing sequence enables one man to handle output of duplex combination.

On 8″ diam packer tube air-operated bag holder slides up and down a distance of 18″. Motor drives auger, packing material by forcing it screwwise into bag while bag and bag holder slide down auger tube against packing pressure. Bags are automatically released after packing.

Conventional systems use four men, one at each filling station and one at each sewing station. Y-type arrangement offers bonus advantage of delivering all sewn bags to one point.

(Y-Veyor system was designed by and uses equipment of Richardson Scale Company, Clifton, N.J.)

Check 3356 opposite last page.

Can lid clip

. . . offers low-cost, time-saving alternative to postal regulation requiring soldering of lids to cans sent through mail.

Clips are attached with press of thumb or blow of hammer and easily removed with twist of screwdriver.

Three sizes in production are G-12 for gallon cans, Q-6 for pint and quart, and P-3 for pint and lesser cans. Post office requires eight clips on gallon can, six on quart and four on pint.

(Can lid clips are development of Anchor Chemical Co., 10721 Briggs Rd., Cleveland 11, Ohio.)

Check 3357 opposite last page.

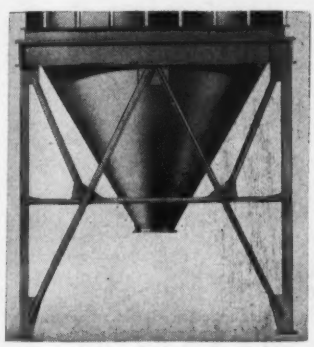
Glass-coated cone bottom for storage structures minimizes arching

Available for 14-ft units up to 50 ft in height

Uses: Cone bottom for storage structures.

Features: Glass-coated interior provides obstruction-free surface and minimizes arching tendencies of some bulk materials. Eliminates possible sources of contamination.

Description: Constructed with steel plates joined by studs, eliminating bolt heads on cone interior, the 60° concentric cone has 2′ diam flanged discharge opening.



Cone bottom for 14′ diam storage structure

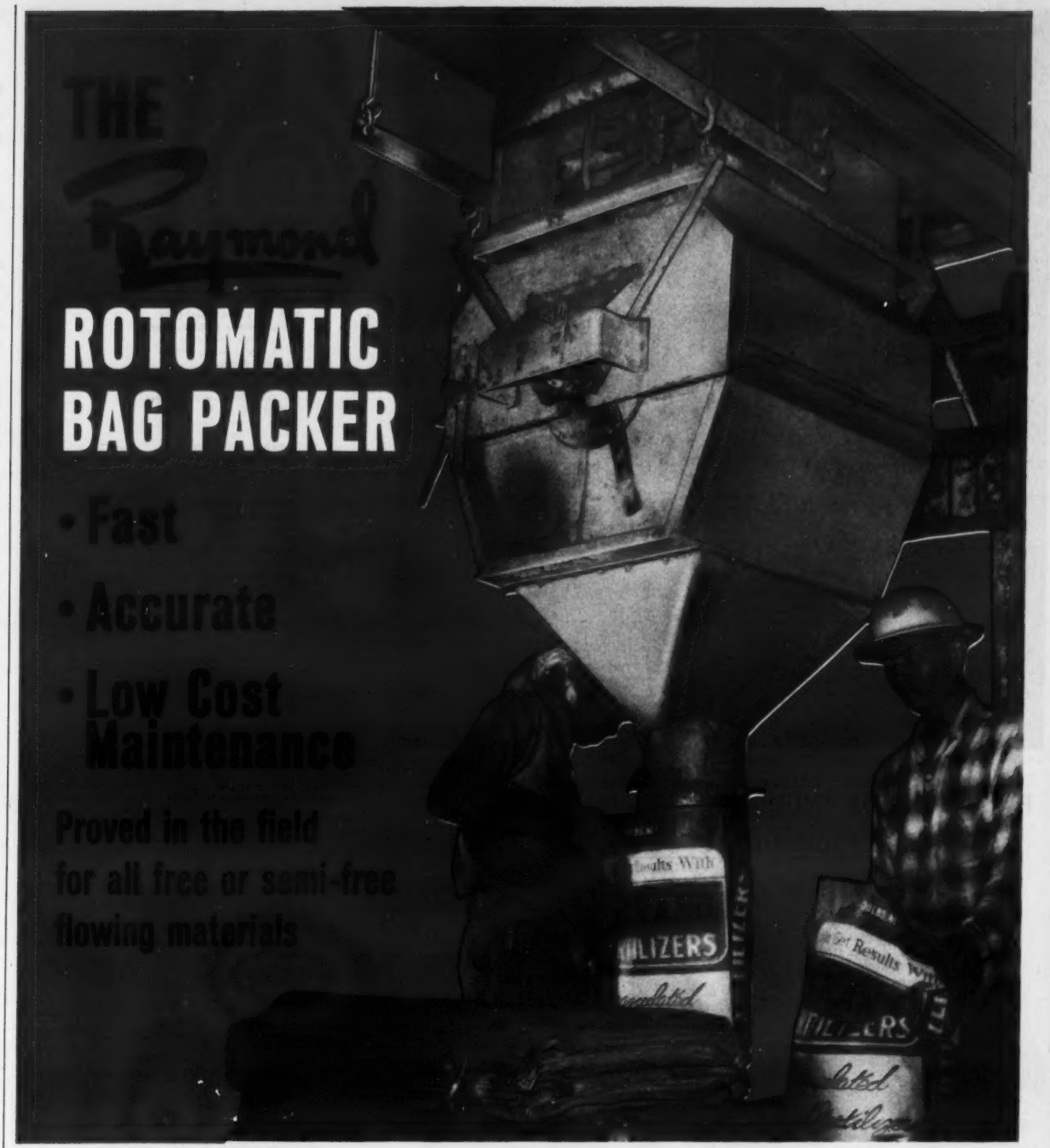
With 50′ structures for which it is designed, combined unit has 8000 cu ft capacity. With specially designed steel support structure for inside or outside installation, unit can withstand wind velocities up to 100 mph.

Small Storage Unit

Also equipped with 60° concentric cone bottom having 18″ diam discharge opening is 8′ diam glass-surfaced bulk materials storage structure. It is available in 10, 15 and 20′ lengths.

(Permaglas cone bottoms and eight-foot cylindrical storage structures are products of A. O. Smith Corporation, Kankakee, Ill.)

Check 3358 opposite last page.



That's right! Speed, Accuracy and low-cost maintenance . . . proven in full production line operation. It's the Bag Packer that can give you new economy in your bag packing operation. The Raymond Rotomatic Packer is fully automatic, all mechanical, and requires no outside motivation such as electricity or compressed air. It is gravity operated and uses the even balance scale principle to deliver proved accuracy. Get complete details now from your Raymond representative or write

Raymond BAG CORPORATION
Middletown, Ohio • A Division of Albemarle Paper Mfg. Co.
Atlanta • Baltimore • Chicago • Kansas City • Louisville • New York
"Maker of RUGGED MULTIWALL PACKAGING for Industry"

Check 3359 opposite last page.

GAULIN

Job-Proven

TRIPLEX PUMPS

Provide High Efficiency . . . Deliver Positive Measured Flow in Metering Applications

In plant after plant, on job after job, Gaulin Triplex high pressure Pumps handle all types of liquids and densities of fluids at lower costs. Their rugged, compact design assures long life with minimum maintenance in metering, transfer and spray drying applications.

Compare these features:

- Horizontal Design provides well area separating product from crank case.
- Well area can be gasketed to provide maximum safety in handling hazardous materials.
- Gaulin cylinder can be disassembled in minutes. Packing assembly readily accessible.
- Capacities from 50 to 7500 GPH . . . pressures from 500 to 12,000 psi.

Write for Bulletin P-55. At the same time, ask for GTA . . . Gaulin Technical Assistance . . . for experienced advice and factual data on the best method to move or blend your product.

Check Chemical Engineering Catalog for the representative nearest you.

Send for the GTA Library of product information.

Gaulin TRADE MARK MANTON Gaulin

55 Garden Street, Everett 49, Mass.

World's largest manufacturer of stainless steel reciprocating, rotary, pressure exchange pumps; dispersers, homogenizers and colloid mills.

Check 3360 opposite last page.

Ask GTA...

Gaulin Technical Assistance — for data on the complete Gaulin line: Homogenizers, Colloid Mills, Submicron Diaperser, Triplex High Pressure Pumps and HX Pumps. Get GTA from your nearest Manton-Gaulin Representative . . .

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White Industrial Sales and Equipment Company
919 Second National Bldg.
Birmingham 6, Alabama
D. B. Gooch Associates, Inc.
5018 First Avenue, North
Boston, Mass.
Joseph H. Bertram & Company, Inc.
570 Hillside Avenue
Needham Heights 94, Mass.
Buffalo 6, N. Y.
A. W. Johnston Co.
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Calgary, Alberta
Harvey Carruthers, Limited
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Alldredge & McCabe
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Richardson Agencies Ltd.
620 Laurention Blvd., Suite 4
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Newark, New Jersey
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Mountainside, N. J.
New York City 24, N. Y.
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Oakland 11, California
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Portland 14, Oregon
The Burhans-Sharpe Co.
Weatherly Building
St. Louis 8, Missouri
Wharton L. Peters Machinery Company
3863 West Pine Blvd.
Seattle 4, Washington
The Burhans-Sharpe Co.
1731 First Avenue, S.
Toronto, Ontario
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164 Bentworth Ave.
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Tulsa, Oklahoma
Edward Soph Company
202 East 18th St.
Vancouver 9, B. C.
Harvey Carruthers, Limited
1639 West 5th Avenue
West Hartford 7, Conn.
Joseph H. Bertram & Company, Inc.
998 Farmington Avenue

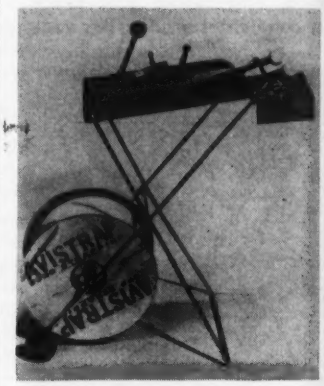
Ease of handling, safety and economy promised by rayon strapping

Uses: Strapping for industrial packaging.

Features: Weighs ¼ to 1/7 as much as conventional strapping of comparable strength, reducing shipping costs. When properly tensioned, it won't harm merchandise.

Description: Fabricated of high-tenacity rayon cord, strapping is supplied on disposable spools on pallets in single- or four-coil cartons.

Coil containing 1000 yards of heavy-duty strapping is



Coil of rayon cord strapping is shown with portable dispenser, tools and seals

13½" in diameter, 6" wide. Strapping may be disposed of by burning. Lack of sharp edges minimizes handling hazards to personnel. Strapping may be imprinted inexpensively.

(Avistrap is being introduced by Industrial Packaging Dept., American Viscose Corp., 1617 Pennsylvania Blvd., Philadelphia 3, Pa.)

Check 3361 opposite last page.

NEXT MONTH

Chas. Pfizer's modern, efficient, labor-saving fine-chemicals packaging line enables the company to keep pace with increasing demand. System includes live storage of empty bags and drums, rapid automatic filling, pallet dispensing. Look for the full details in August CP.

THAT'S INTERESTING

Spray for tight shoes

Troubled with tight shoes? Soon you may just get a can of a certain aerosol spray product and spray. Put shoes back on and walk around for 15 minutes. By that time, leather should have stretched, and if you wish, polishing shoes will produce a high gloss.

Tumor seen by scanner

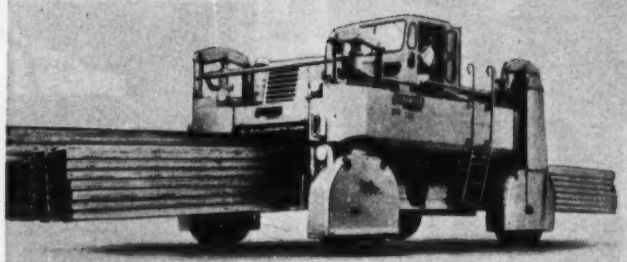
A device which will enable surgeons to know the size and shape of a tumor before cutting open a patient is being developed at Oak Ridge National Laboratory.

Patient is given radioactive pharmaceutical compounds which localize in abnormal tissue. Device, consisting of scintillation scanner and highly directional radiation counter, is then moved over the patient until it pinpoints size, location and configuration of tumor.

For more information on product at right, specify 3362 see information request blank opposite last page.

TOWMOTOR-GERLINGER

offers you three complete capital-saving services!



1 YOU LEASE *without down payment!*

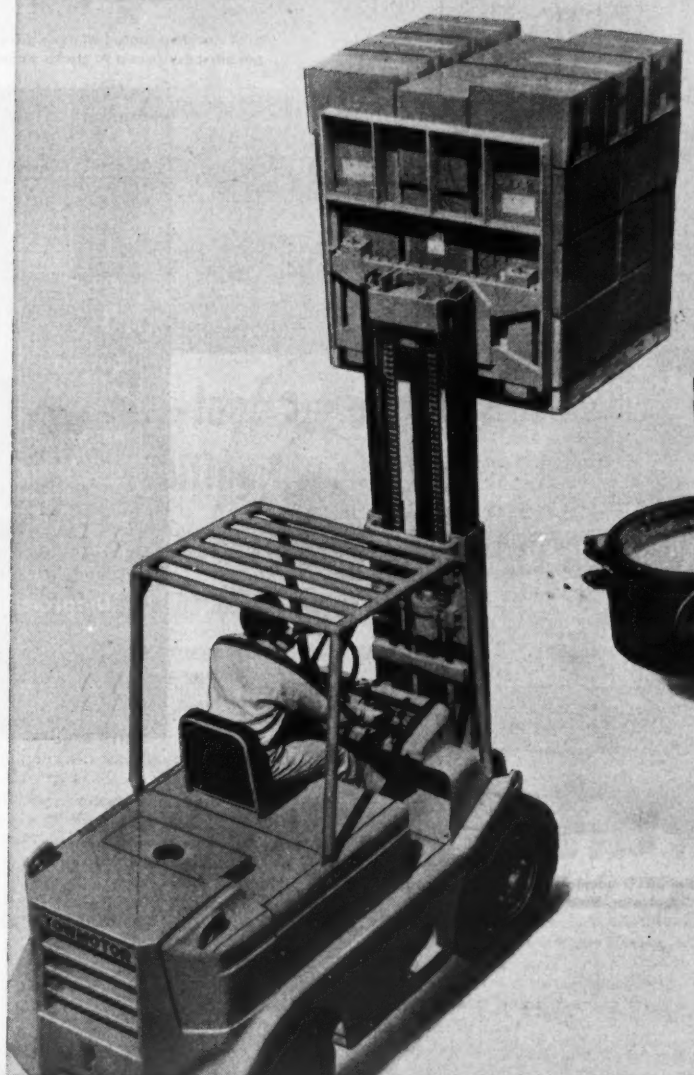
You don't make a *down payment* when you use the Towmotor-Gerlinger Lease-A-Truck Plan. You put T-G equipment to work on a continuous, year-'round basis. You just make a small monthly payment—paid out of savings the equipment produces.

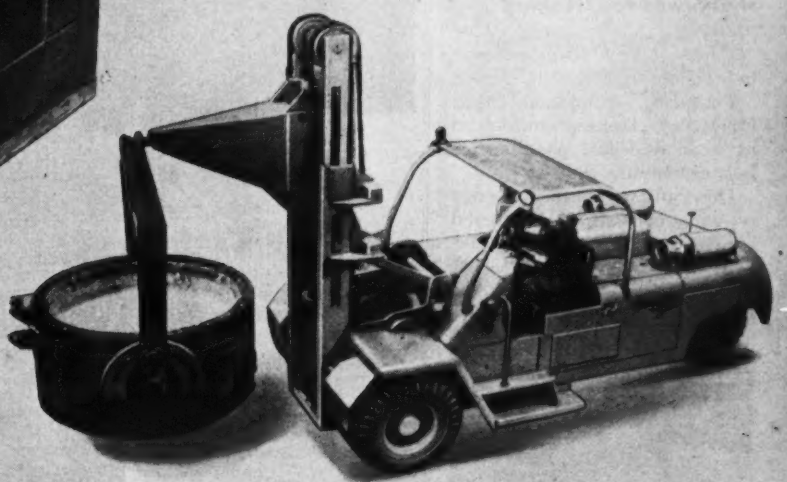
2 YOU RENT *without cash outlay!*

You don't tie up working capital when you *rent* Towmotor-Gerlinger fork lift trucks and material carriers. You put them to work immediately. You start cutting handling costs immediately. Your only cash outlay is one small monthly charge.

3 YOU BUY *and save as you pay!*

You don't pay cash for Towmotor-Gerlinger equipment when you use our low-cost Time Payment Plan. You make reasonable monthly payments. Low interest rates make it easy. Handling economies consistently pay the monthly cost many times over.





Complete factory-supervised maintenance can be included in *any* of the above plans! For complete information, write Towmotor-Gerlinger Rental Division, Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR -GERLINGER
THE ONE-MAN-GANG®

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

Cone-pouring attachment

. . . is feature of steel drum dumper designed to operate at lifting heights from 12″ to 50′. Dumper handles powders, granulars, ceramics, scrap and liquids of heavy viscosity. Rated capacities are from 100 to 5000 lb depending on unit selected.

(Cesco steel drum dumper is product of Conveyors and Dumpers Inc., division of Mercury Industries, Hillsdale, New Jersey.)

Check 3363 opposite last page.

Lagged wing pulley ends shutdowns for cleaning

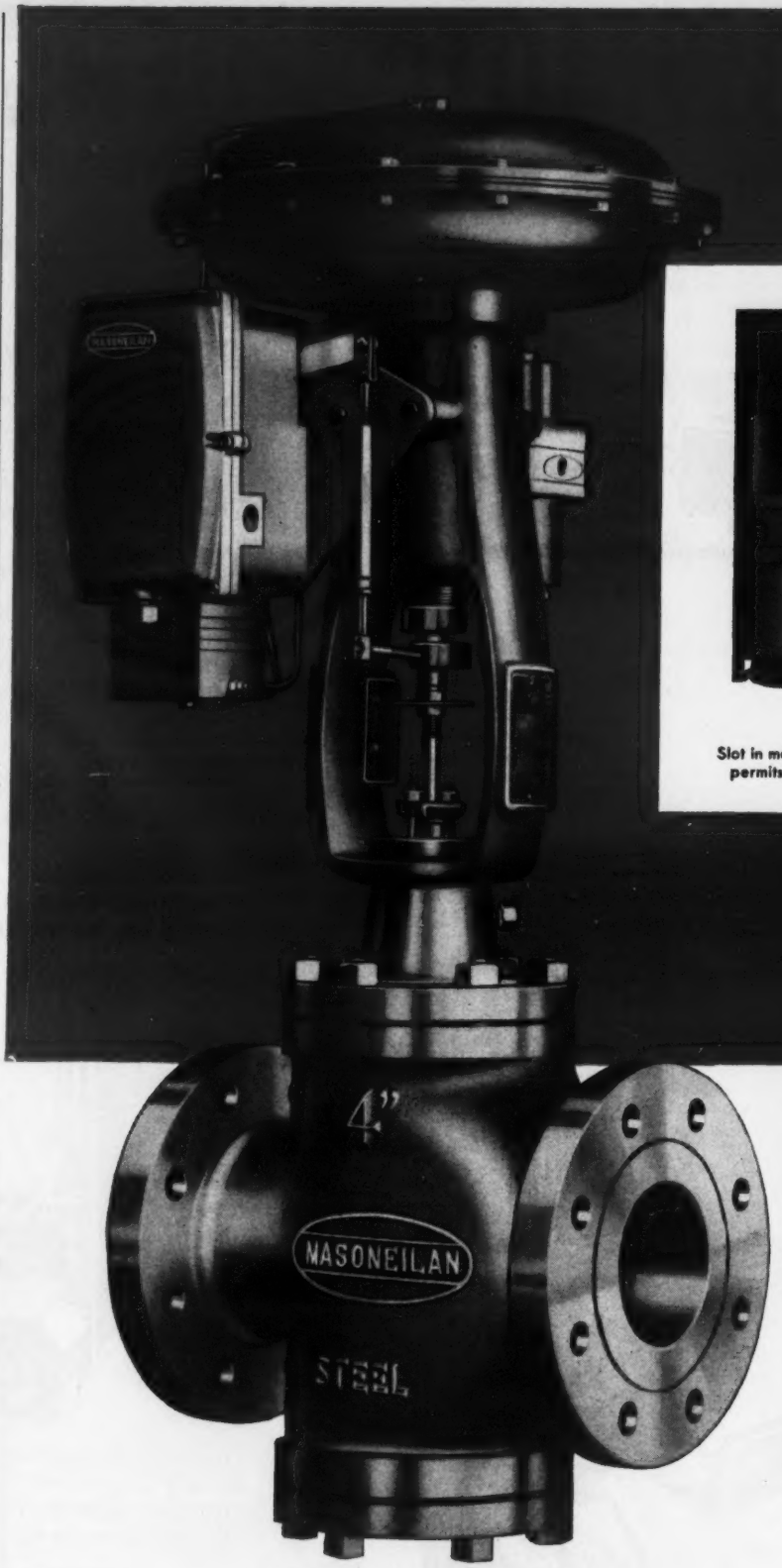
Uses: Pulley for conveyor belt.

Features: Eliminates need for pulley-cleaning shutdowns at head and tail positions of belt conveying systems.

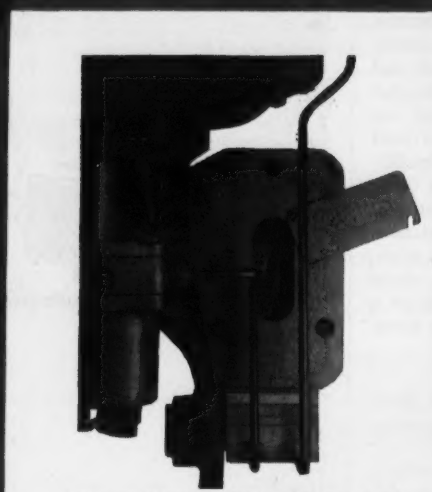
Description: Exterior edge of wing consists of U-shaped

Self-cleaning belt pulley

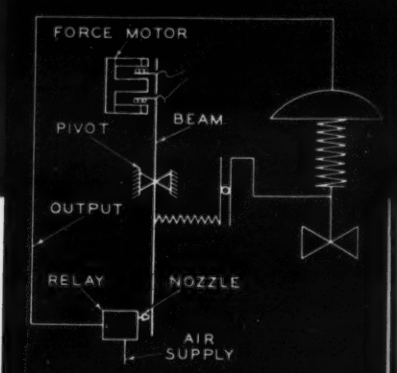
steel channel which receives steel-encased rubber bar. Since rubber lagging is an individual separated strip, it compresses on contact with belt. When arc of contact is broken, rubber springs back



Model 8010 mounted on spring-diaphragm actuator. Note compact design.

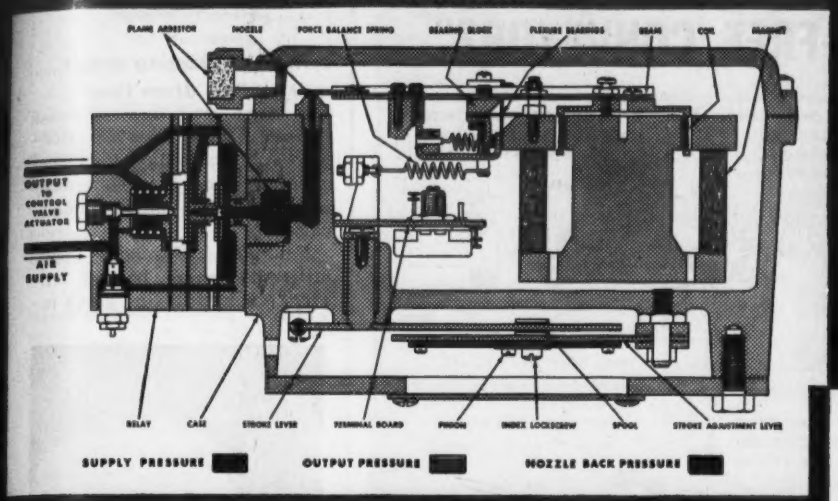


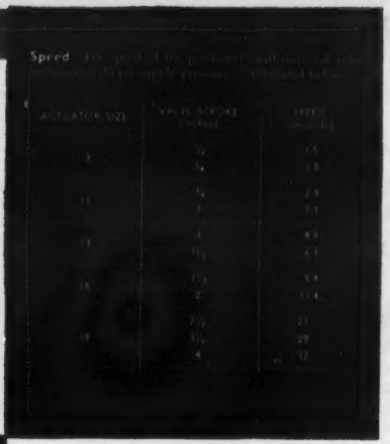
Slot in mounting plate (with swing-free cover) permits easy access to stroke adjustment.



Diagrammatic of operation.

Schematic of air circuits.





Performance Data

Open-loop Gain* — approximately 100
Linearity — within ±1% of full stroke
Repeatability — within 0.2%
Load Sensitivity — Output pressure change of 1.2 psi per 0.1% of full stroke offset
Supply Pressure Effect — ±1% of full stroke for ±5 psi change from 20 psi

Now! Masoneilan E/P Positioner with Stem Velocity Feedback

Combines high open-loop gain and closed-loop stability to give you Precise Positioning and Superior Dynamic Response

The new Masoneilan Model 8010 Electropneumatic Positioner offers optimum performance plus these design advantages:

- A true positioner — *direct* comparison of valve stem position with controller output signal provides dynamic response and positioning accuracy not obtainable with transducer and pneumatic positioner combination.
- Electrical circuit easily adapted to a variety of controller output signals.
- Extra large stabilized magnet, plus efficient magnetic circuit, provides high force changes.
- Explosion-proof construction meets requirements of Class I, Division I, Group D.
- External stroke adjustment accessible without removal of cover — no exposure of electric wiring.
- High capacity relay for fast stroking speeds. Relay may be mounted in any one of four positions to facilitate piping.
- Balanced beam permits installation of valve in any position without shift in calibration.
- Available for 3-15 psi or 6-30 psi valve spring ranges and for split-ranging. Standard stroke ranges ⅜"–3" and 2"–4". Others available.
- Available with direct or reverse action and for direct or reverse actuators.

You can now utilize the desirable characteristics of electronic control and obtain the power and smooth throttling action of pneumatic valves by using Masoneilan Model 8010 E/P Positioners. Full details on request. Ask a Mason-Neilan representative or write direct —

MASONEILAN

MASON-NEILAN

Division of Worthington Corporation

25 NAHATAN STREET, NORWOOD, MASS., U. S. A.

Sales Offices or Distributors in Principal Cities in United States and Abroad

In Canada: Worthington (Canada) Ltd., Mason-Neilan Division

Check 3364 opposite last page.

to normal height and automatically cleans itself.

Tight contact between rubber bars and belt spalls off dried material on underside of conveyor belts. This prevents buildup which ordinarily would score and wear belts, thus increasing belt life. Lagging may be replaced in field when necessary.

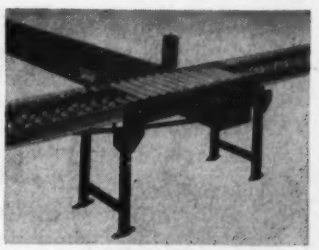
(Turn-Clean wing pulley is development of Van Gorp Mfg., Inc., Box 123, Pella, Iowa.)

Check 3365 opposite last page.

Conveyor 'accumulation' problems solved with transfer accessories

Two transfer units—manual right-angle device and live-roller powered section—are being offered as means for increasing versatility of and solving "accumulation" problems of adjustable pressure conveyors.

Manual unit, furnished in two-foot unit lengths, 18 or 24" wide, for insertion in conveyor line, is operated by



Live-roller transfer unit is powered by belt that drives main conveyor line

hand or foot lever which elevates set of wheels at right angles to main line.

Materials can be merged from two lines or dispersed from single line into two lines with live-roller unit which is powered by same belt that drives main line. It can be inserted at any point along line.

(APC transfer accessories are development of The Rapids-Standard Co., Inc., 342 Rapistan Building, Grand Rapids, Michigan.)

Check 3366 opposite last page.

"WHO SAYS THERE'S SUCH A THING AS A MAINTENANCE-FREE CONVEYOR?"

TAKE A LOOK AT CLEVELAND AND SEE WHAT YOU THINK!
EVEN DUST CAN'T GET INTO THE ENCLOSED POWER UNIT!
THERE'S ONLY ONE MOVING PART—AND IT'S AUTOMATICALLY LUBRICATED!
FLEXIBLE SUPPORTS NEVER NEED TUNING OR ADJUSTMENT!
ALL SURFACES ARE EASILY CLEANED, SAFELY, TOO!
CLEVELAND CONVEYORS ARE ALL METAL. HEAT UP TO 1600° F. CAN'T HURT 'EM!
AND WHEN MAINTENANCE IS NO PROBLEM, INACCESSABILITY IS NO PROBLEM!
THAT PROVES IT TO ME... CLEVELAND CONVEYORS ARE AS MAINTENANCE-FREE AS THEY CAN GET!
WE CAN PROVE IT TO YOU TOO!

IF YOU HAVE *Bin Stuck Lately?* CALL CHerry 1-7157 FOR A FEEDER OR CONVEYOR *for every installation ...every need*

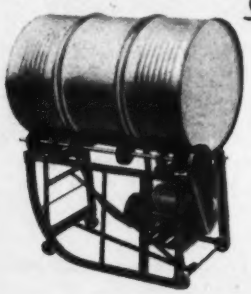
THE CLEVELAND VIBRATOR CO.

Dept. 7C, 2706 Clinton Ave. • Cleveland 13, Ohio

Check 3367 opposite last page.

NOW A LOW COST Portable Drum ROTATOR *Safe... Fast... Economical*

MORSE MODEL 200



• MIXING • BLENDING
• TUMBLING • CLEANSING

Handles 30 and 55 gal. drums; 1 and 5 gal. containers with special attachment; weight capacities to 500 lbs. Weighs only 135 lbs. Available with 10, 20, or 40 rpm. Exclusive features assure smooth, thorough operation. Neoprene drive wheels are oil and chemical resistant. Retractable casters facilitate loading. Also available with explosion-proof or air-driven motors. Clip this ad to your letterhead for free MORSE Catalog.

Clip this ad to your letterhead for free MORSE Catalog.

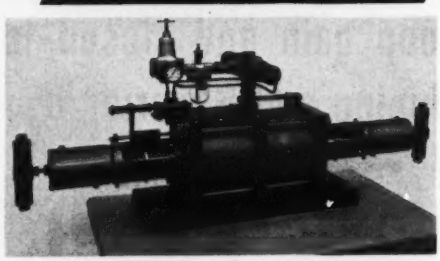
MORSE MANUFACTURING CO., INC.

757 West Manlius Street, East Syracuse, N. Y.

Check 3368 opposite last page.

UDELL

MODEL DP-DE 100,000 psi PUMP



Powered by air or natural gas to 250 psi they deliver discharge pressures from zero to 100,000 psi for injecting catalysts, chemicals, or other additives in chemical, petrochemical plants and processing systems; also for LPG and hydrocarbon transfer and staging. Pump exhaust may be returned to low pressure system. Pumps can be furnished with discharge-to-powering pressure ratios of 1100 to 1.

UDELL

SALES OFFICE
5117 Gulfton — P. O. Box 18305
Houston, Texas

Check 3369 opposite last page.

Critical packaging needs met by PVC drum liner

Uses: Drum liner for storage and shipping of critical chemicals and for drum mixing of "small batch chemicals."

Features: Specially constructed round bottom enables liner to fit like glove in-

Heavy duty plastic liner

to standard 55-gal steel drum. It resists most chemicals, except very heavy acid series in concentrated form.

Description: Fabricated of 20-mil specially-formulated PVC, liner resists temperatures from −25 to +230°F.

Stocked in 55-gal size, it can be made in any size, square or round.

(Plastic drum liner is development of Dor Plastics Corporation, division of Protective Lining Corporation, 22 Woodhull St., Brooklyn 31, New York.)

Check 3370 opposite last page.

"Baxter, there's a gentleman here that I want you to show around the plant."

NEW LITERATURE
Material Handling and Packaging

Battery-powered fork truck with 5000-lb capacity has complete engineering and dimensional specifications presented in four-page Bul SS-364—Industrial Truck Division, Clark Equipment Company.

Check 3371 opposite last page.

Handling hydrocarbons, including shipping methods, types of containers, general unloading techniques and hazards, is covered comprehensively in 36-page illustrated Handling C_4 Hydrocarbons Bul — Petro-Tex Chemical Corporation.

Check 3372 opposite last page.

Aerosol containers of aluminum, extruded one-piece seamless construction are pictured and described in eight-page, full-color catalog. Listed are 10 sizes ranging from one-half to four fluid ounces. Interior resin coatings and exterior finishes are briefly described. "Peerasol Containers" — Peerless Tube Company.

Check 3373 opposite last page.

Lift trucks, including LP gas and diesel-powered models, are detailed in two bulletins. BU-481A (2000-10,000 lb capacities) and BU-638 (3000-8000 lb) — Engine-Material Handling Division, Allis-Chalmers Manufacturing Company.

Check 3374 opposite last page.

Analog-to-digital converter for electronic weighing is featured in four-page bulletin. Unit translates the weight message from an electronic load cell into one of the several "languages" which are "spoken" by automatic business machines. Bul ED-16 — Fairbanks, Morse & Co.

Check 3375 opposite last page.

Pros and cons of using standard trucks vs special trucks for unusual handling problems are presented in eight-page "Standards vs Specials" Bul—Automatic Transportation Company, division of The Yale & Towne Manufacturing Company.

Check 3376 opposite last page.

Polyethylene film specifications are detailed in 14-page booklet. Included are packaging and marking specifications, schematic drawings showing roll put-up, charts and formulas for calculating yield and standards for manufacturer's films. Specifications Booklet — Department K-P, Chippewa Plastics Co.

Check 3377 opposite last page.

"H-25 PAYLOADER® delivers 25% more, increases operator comfort and safety"*

*Mr. J. B. Evans, partner of Evans, Reed and Williams at Sylvania, Georgia, says, *"The new H-25 'PAYLOADER' is moving better than 25% more material than the previous model HA. The smooth operation assures cleaner working floor conditions, faster delivery, plus operator comfort and safety. It's giving all-around satisfactory service. Our original model HA gave exceptionally good service for 9 years and our larger model HAH operated six years before it had a major overhaul."*

There are many reasons why the Model H-25 will dig, carry and deliver more tonnage with lower operating and maintenance costs than anything near its size. One is the power-shift transmission — exclusive in its class — with two speeds forward *and* reverse. Others are the power steer; power-transfer differential; 4,500 lbs. breakout force; 2,500 lb. carry capacity; shortest turning radius of only 6 ft.

The H-25 has been engineered to provide extraordinary protection against dust and dirt damage: triple air cleaner system; cartridge-type oil filter on all three oil systems; sealed, self-adjusting service brakes; parking brake enclosed in transmission; special grease and oil seals on all vital points.

Your Hough Distributor wants to show you what an H-25 or larger "PAYLOADER" tractor-shovel can do on your work. See him soon or send for full information.

THE FRANK G. HOUGH CO. 7-A-1
744 Sunnyside Ave., Libertyville, Ill.
Send data on new H-25 "PAYLOADER"
Name
Title
Company
Street
City
State

HOUGH®
THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

Check 3378 opposite last page.

Most accurate of all mechanical variable speed drives:

positive P.I.V.

Infinitely Variable

For stepless, slipless speed changing, there's nothing like Link-Belt P.I.V.—the *only* chain-driven variable speed drive.

With P.I.V., teeth—not tension—assure positive, high-efficiency power transmission. You can select any speed in its range—find it instantly, hold it indefinitely. The exclusive all-metal, self-tooth-forming chain meshes with radially grooved wheels . . . maintains positive, nonslip contact at any speed under all loads.

P.I.V. drives are fully enclosed . . . unaffected by atmospheric conditions. They're available in 8 sizes, 16 standard types, capacities from ½ to 25 hp. Type RS is available in capacities up to 50 hp.

For full details, ask your Link-Belt district sales office or authorized stock-carrying distributor for Book 2274. You'll find them in the yellow pages of your local phone directory under Power Transmission Equipment.

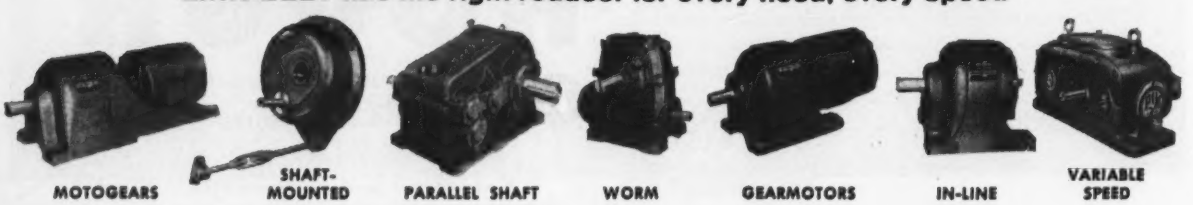
INSTANT SPEED CHANGING is achieved by simply turning handwheel to desired position on easy-to-read dial. P.I.V. drives are also available with electric, pneumatic or hydraulic controls. Here P.I.V. drive and Link-Belt roller chain accurately regulate speed of rolls in roller-hearth furnaces used to heat-treat jet engine parts.

LINK-BELT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

15.345

LINK-BELT has the right reducer for every need, every speed



MOTOGEARS · SHAFT-MOUNTED · PARALLEL SHAFT · WORM · GEARMOTORS · IN-LINE · VARIABLE SPEED

Check 3379 opposite last page.

Taconite handling operation at the largest taconite pelletizing plant in the Mesabi Range is dramatically discussed in 12-page bulletin. All operations are covered. Fact File ER-33-2—Fuller Company.

Check 3380 opposite last page.

Heat sealing of polyethylene film, some of the problems, their causes and corrective measures — are considered in Heat Sealing Data — U. S. Industrial Chemicals Co., Division, National Distillers and Chemical Corporation.

Check 3381 opposite last page.

Continuous elevators, available in two series each featuring direct feed into overlapping buckets and gravity discharge, are described in Bucket Elevators Bul — The Bucket Elevator Company.

Check 3382 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Forty-two ways to transfer materials on conveyor systems are enumerated in Conveyor Transfers Bul — The Rapids-Standard Co., Inc.

Check 3383 opposite last page.

Case gluing and sealing system which feeds glue under light air pressure from reservoir through an applicator directly onto case flaps is described in four-page Glu-Line Bul — Portland Division, Emhart Manufacturing Company.

Check 3384 opposite last page.

Handling equipment, including automatic dump boxes, automatic side dump trailer trucks, multi-purpose carts, carboy trucks and vertical drum lifters, is itemized in P-S CAT — Palmer-Shile Company.

Check 3385 opposite last page.

Automatic batching advantages, procedures and equipment are presented in Automatic Batching Handbook — The Howe Scale Company.

Check 3386 opposite last page.

Conveyor-scale system for flow-rate control and total thru-put measurement of bulk materials is subject of four-page Bul 60 — Weighing & Control Components, Inc.

Check 3387 opposite last page.

Production-homogenized charcoal igniter beats lab-scale quality

Forces of impact, attrition, turbulence and ultrasonic cavitation convert 6000 lb/hr of unstable kerosene emulsion into stable, viscous gel

TED F. MEINHOLD, Associate Editor
with **MONTFORT A. JOHNSEN,** Director of Research
Peterson Filling and Packaging Company

Compact machine occupies only 18 x 18" floor space, operates practically silent

Exploded view shows homogenizer's three major components. Unit can be disassembled in matter of minutes

"We made a product that was even better than what we could make in our laboratory." These words just about sum up the results of the first production run made with a compact high-speed homogenizer at Peterson Filling and Packaging Company, Danville, Illinois. Used to help manufacture a novel charcoal igniter for outdoor barbecuing, the unit converts 6000 lb per hr of unstable kerosene emulsion into a thick, blue-white gel. Viscosity ranges up to 30,000 centipoises, depending upon conditions.

The charcoal igniter, marketed under the tradename "SIZ," resembles aerosol shaving cream. It is packaged with a propellant in a pressurized can so that it can be dispensed as a foam across top of charcoal. Tossing a lighted match into foam ignites it instantly.

Public acceptance for the chemical specialty came so fast that Peterson practically had to gear up for increased production overnight. One of their major problems was to find a suitable homogenizer. In the laboratory, a small blending device had been used to produce the gel. However, first batch made with the production-size homogenizer yielded a product that had higher viscosity and better stability than could be produced with the laboratory apparatus. Needless to say, Peterson bought the machine.

Peterson manufactures the material from an emulsion produced by spraying a petroleum distillate into a strongly agitated solution containing certain emulsifiers. This forms a white cream of low viscosity. Cream is sent through the homogenizer where it is transformed into the jelly-like finished product. Temperature of material going through the homogenizer is 60°F, with hardly any heat pickup during passage.

Ultrasonics Help

In the machine, known as the "Jet-Mogenizer", impact, attrition, turbulence and ultrasonic cavitation combine to deliver optimum homogenization at high velocity.

Unit has 380 splines in rotor-stator which have been deliberately thrown out of register so as to convert the fluid flow from a constant rhythmic vibratory pattern into an intermittent variable one. This causes subsonic effects which set up highly intensified turbulence in material being processed. Violent interparticle attrition follows as the fluid mass is forcibly impacted through the restricted spline vents.

Peripheral velocity of particles reaches 4500 rpm. Ultrasonic frequency vibrations exceeding 20,000 cps are generated as particles impinge on the sonic blade. Continuous cavitation is set up within particles. Result is a fully dispersed, smoothly blended emulsified product.

Clearance between rotor and stator can be easily adjusted to obtain optimum results, even while machine is operating. Cleaning also presents no problem. Water or solvent may be flushed through machine, or it can be disassembled in matter of minutes.

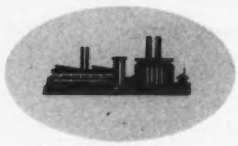
The unit at Peterson is powered by a three-hp explosion-proof motor. Because of perfect dynamic balance

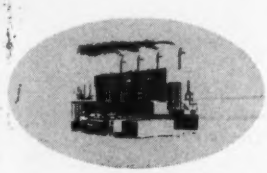
STAINLESS STEEL • MONEL • NICKEL • INCONEL • CARPENTER 20 • HASTELLOY •
TITANIUM • ALUMINUM • EVERDUR • CLAD AND ALLOY STEELS • SPECIAL METALS

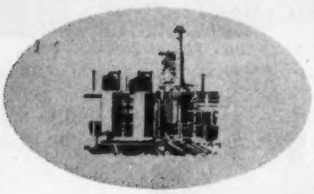
Swepco SELECTED BY THE LEADERS OF INDUSTRY

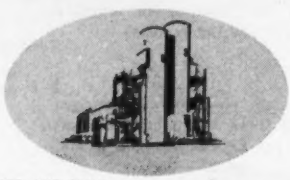
PETROLEUM

FOOD PROCESSING


NUCLEAR


CONSTRUCTION


CHEMICAL


PAPER AND PULP

Swepco, pioneer of machine welded large diameter pipe and tubing, proudly announces the availability of a new quality line — FFR, Full Finished Rock-Forged Pipe and Tubing.

Manufactured to A.S.M.E., A.S.T.M. and Armed Forces Specifications, this new product finds applications where high temperature, corrosion, and high pressures are critical.

Ask one of the Swepco authorized distributors for complete details on Swepco's FFR, or write direct.

Swepco TUBE CORPORATION
One Clifton Boulevard • Clifton, New Jersey

The Major Manufacturer of Welded Large Diameter Pipe and Tubing
In stock at your local distributor from 2½" I.P.S. to 12" I.P.S.

STEEL SERVICE CENTER INSTITUTE

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Check 3388 opposite last page.

the machine operates almost completely silent. The only real indication of its performance is the large volume of completed emulsion that pours into the holding tank. The compact machine occupies only 18 x 18" floor space and weighs 250 pounds.

The homogenizer has been operated three shifts a day, seven days a week. After six months of continuous operation it was dismantled for inspection. It was found to be in surprisingly good shape. A pair of bearings and a ring seal were replaced as a matter of good engineering practice. The machine was then reassembled for further use on the production line.

Except for one incident, the machine has operated without mishap. Immediately after plant started up, a stainless steel shaving somehow got into the new line between the unit and the screen which protected it. The object worked itself into the machine and became lodged between the stator and rotating head — causing severe scoring.

As soon as the homogenizer began to bind, production was halted and a telephone call made to the equipment manufacturer. A replacement head was rushed out via air freight. Production commenced again the following morning. The original head was then sent back to the manufacturer for repair.

(Jet-Mogenizers are product of Buschman Products, Inc., 114 East 40th Street, New York 16, New York.)

Check 3389 opposite last page.

Atomic physics division for NBS

Atomic physics group has been established by the National Bureau of Standards. Major areas of research for the new division include determination of atomic constants and other physical properties associated with free electrons, atoms, ions and molecules.

Also to be performed are quantitative studies of the

microscope, mutual interactions of ions, atoms, molecules and their constituent particles; and studies of solid state, particularly of semi-conductors.

(Information courtesy of National Bureau of Standards, U. S. Department of Commerce, Washington 25, D. C.)

Process cuts cost of making heavy nylon castings

Permits economic output of six-lb parts

European process for casting heavy nylon parts has been introduced in the U. S. Castings weighing up to six lb reportedly can be made at considerable less cost than

King-sized nylon castings such as these can now be made economically

heretofore possible with conventional methods.

Previously, expensive molds and other equipment restricted nylon molding to large volume runs of extremely lightweight parts. With the new method, heavy castings can be made economically through lower tooling costs, smaller running rates and short run requirements.

Process is said to make use of higher viscosity nylon. There is practically no limitation on cast-in inserts, threads, lugs, intricate shapes or varying thicknesses.

(Further information about Nylocast process may be obtained from Nylon Molded Products Corp., Dept. R-61, Garrettsville, Ohio.)

Check 3390 opposite last page.

How Much Steam Should a Steam Trap Trap?

. . . some answers to commonly asked questions about the primary job of a steam trap

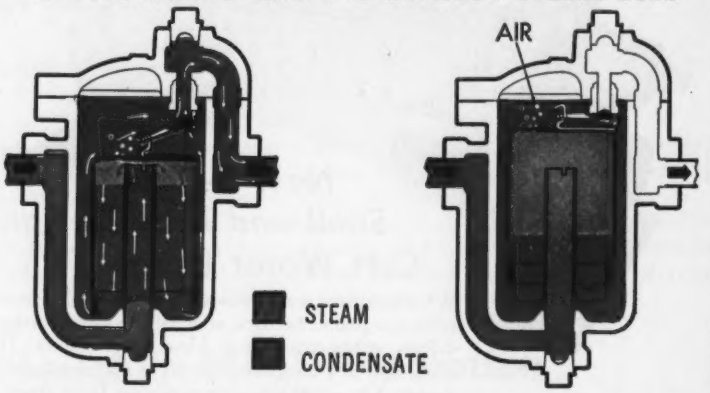
You don't need a doctor's degree in thermodynamics to answer the question at the top of this page. Naturally, a steam trap should trap *all* the steam.

Unfortunately for you, the problem isn't quite that simple. After all, a shut off valve would trap all the steam . . . and condensate, and air, and carbon dioxide as well.

So we'd better amend the answer to the question this way: A steam trap should trap *all* the steam but *must* remove condensate, air and carbon dioxide as rapidly as they accumulate.

With this established, let's take a closer look at what's involved:

HERE'S THE STEAM TRAP DESIGN THAT GETS RID OF CONDENSATE AND AIR WITHOUT STEAM LOSS



Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

A Steam Trap Should Trap All The Steam

If you've had experience with several different makes of traps, you already know that some trap steam better than others. The operating principle of the trap is what makes the difference. We like to talk about it because Armstrong traps are designed so that no steam can get to the orifice. The valve is always water sealed. Result: *More efficient steam utilization, lower fuel costs.*

A Steam Trap Should Remove Condensate

All traps remove condensate—after a fashion. For maximum efficiency in the unit being drained, though, the trick is to get it out without waiting for it to cool and without leaking steam.

Armstrong's water sealed valve takes care of steam leakage. The inverted bucket operating principle opens the trap for water regardless of its temperature. This means you get the condensate out as quickly as it accumulates. Result: *Higher temperatures and better heat transfer in steam heated units.*

A Steam Trap Should Remove Air and CO_2

Part and parcel of the condensate removal problem is removal of air as well as oxygen and carbon dioxide—two real troublemakers. Air tends to reduce operating temperatures and interfere with heat transfer. CO_2 goes into solution to form corrosive carbonic acid which, for example, can eat unit heater tubes. O_2 aggravates the situation. Believe it or not, but all traps don't properly remove air and CO_2.

By now, you've probably guessed that Armstrong traps *do* remove air and CO_2. Armstrong design (see illustration) provides continuous venting of air and CO_2. By opening suddenly, the Armstrong trap creates a momentary pressure drop to "pump" the air down to be vented. Result: *Higher temperatures, faster heat-up, better heat transfer and reduced corrosion.*

Note: When required, specially sized air vents are furnished. For fast heat-up of low pressure on-and-off units, Armstrong provides open float and thermostatic air vent traps.

What's the Final Answer?

Summing it all up, you'll get the best service from steam heated units that are equipped with traps designed to trap *all* the steam and remove air and condensate as quickly as it accumulates. In our prejudiced viewpoint, this means Armstrong traps. More important are the several thousand users of Armstrong traps who have proved the point.

Before you make up your mind, though, consider the minimum maintenance requirements of Armstrong traps . . . and the convenient assistance your local Armstrong Representative provides. These are important plus values.

Put Up or Shut Up

We're so confident that we "put up". Armstrong traps are unconditionally guaranteed to satisfy. So you can find out for yourself with practically no risk. If you're not completely satisfied with the way they do their job, you can get your money back.

* * *

The 44-page Armstrong Steam Trap book goes into greater detail on these and other Armstrong features. It also discusses trap selection, installation and maintenance. Ask your Armstrong Representative for a copy or write

Armstrong Machine Works
8807 Maple St.
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

Check 3391 opposite last page.

Young
Heat Exchangers

New 4-Pass Shell and Tube Design Cuts Water Usage 75%

Where critical water shortages, and high water rates are prime factors, specify the new Young 4-Pass water-conserving Heat Exchangers. If corrosion is a concern, specify a stainless steel design. Over 100 sizes are available from stock, including single and 2-Pass models. Write for Catalog No. 1258A.

HC HORIZONTAL CORE AIR COOLED UNITS by Young

HC Units are high-capacity, forced-draft air cooled heat exchangers featuring vertical air discharge. They are ideal for cooling acids, light or heavy end liquids, caustics, oils, for condensing vapors or steam, or for maintaining temperature control of various solutions.

Young Sales engineers are ready to help you solve any heat transfer problem. Write for Catalog No. 557.

Write Dept. 370-G

for all your atmospheric and fluid cooling requirements see

Young RADIATOR COMPANY

General Offices: Racine, Wisconsin
Plants at: Racine, Wisconsin and Mattoon, Illinois

Check 3392 opposite last page.

Electrophoretic technique separates solutions within seconds

Causes ions to follow divergent spiral paths

Components of solutions or suspensions can be separated within seconds by an electrophoretic method developed by the University of California Medical School, Los Angeles. Process invloves use of electromagnetic forces in combination with an electric field. This causes ions of different mobilities to follow divergent spiral paths.

The ions form very thin, sharp streaks and separation takes place almost immediately. To drain off the streaks of separated ions, a cylindrical peg is placed in path of ions. Streaks flow around the peg and can be withdrawn through channels in its side.

Preliminary studies have been conducted with dyes and cell suspensions. Future plans call for possible separation of cancer cells.

(Information courtesy of University of California, Berkeley 4, California.)

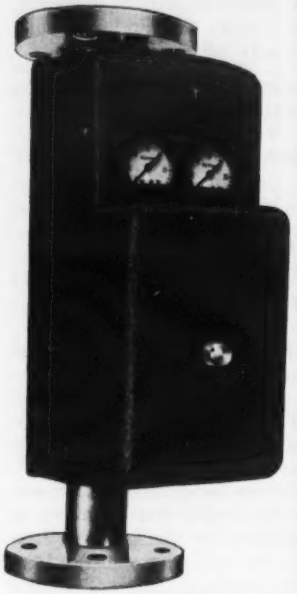
Acid reclaiming process offers double benefits to steel industry

Recently developed electrochemical process permits steel mills to not only recover spent acid but to reclaim dissolved iron from the acid as well. Use of the process might not only eliminate the problem of water pollution resulting from waste acid disposal, but it could also save money.

A typical steel plant in daily operation requiring about 50 tons per day of sulfuric acid for steel pickling, might save almost $500,000 per year in acid and waste disposal charges. Total capital investment required for a reprocessing plant would be about $700,000.

(Further information about acid recovery process may be obtained by writing to Ionics, Inc., 152 Sixth St., Cambridge 42, Mass.)

MAGPNUTRAX* FLOWMETER



No extension troubles—ever! (No extension—that's why!) No sludge-catching elbows or stagnant pockets, either. With this new rotameter-transmitter the flow goes straight through. Neat as you please. Even if you're metering slurries, still bottoms and other such gunky stuff. Transmits electrically or pneumatically, however you like, and can include flow integration, too. A word from you will bring Design Specification Sheet DS-361. It tells you what you'll want to know.

Trademark of the Brooks Rotameter Co.

BROOKS ROTAMETER COMPANY
760 A Street
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Check 3393 opposite last page.

THAT'S INTERESTING

Antiknocker unveiled

Tetraethyl lead (TEL), for 38 years king of antiknock agents, is being supplanted by tetramethyl lead (TEM) in Standard Oil Company of California gasolines. TEM proved superior to TEL in high octane high aromatic content fuels used in modern high compression ratio cars. TEL breaks down too early under higher cycle temperatures of these cars, according to researchers. Use of TEM raises road octane quality of high octane premium gasolines one to two numbers in most cars.

Sales drive

Chemical industry salesmen are driving further this year—1,672 miles per month on the average—than in 1959—1,589 mpm—to make their sales.

For more information on product at right, specify 3394 see information request blank opposite last page.

NINE FULLY EQUIPPED J&L CONTAINER DIVISION PLANTS OFFER YOU:

"TO-THE-MINUTE"

delivery to every petroleum packaging plant in the country!

"To-the-minute" delivery of dependable J&L drums and pails for petroleum products is possible because of the strategic location of these *nine completely equipped* J&L container plants.

Proof? Seven of these nine Jones & Laughlin plants are located in the four major consumption areas for lubricating and grease products.

Every year, more of the major petroleum producers are turning to J&L for "to-the-minute" delivery of controlled quality containers.

Call your nearby Jones & Laughlin Container Division representative for your next order. Or write to the J&L Container Division for the location of your nearest source of supply.

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FROZEN BOLTS ... BEARINGS

It's fast and accurate — shoots 15 feet — a drop or a squirt. It's labeled Kroil — so you can grab it quickly when a frozen bolt, screw or bearing starts to cost expensive time or threaten production.

That is when Kroil creeps into millionth inch spaces to soften rust, dissolve gum and supply lubrication to loosen the parts. It's fast and it's positive.

"Kano Kroil always opens up the tight fitting covers on fire extinguishers for us. We have found such covers we could not force off with a blow of a hammer. Several minutes' seepage of Kroil did the trick," so says a service organization for fire extinguishers.

If you are not one of the 19,000 industrial plants already using Kroil, send for a gallon on the proposition that it will loosen the most stubborn frozen part or you get your money back.

Kroilers are priced at $1.50 each. As an inducement to try Kroil we offer the combination of one Kroiler and one gallon of Kroil—(listed at $4.35) for $5.25 f.o.b. factory.

Ask for "Kroiler Deal" — order direct.

KANO LABORATORIES

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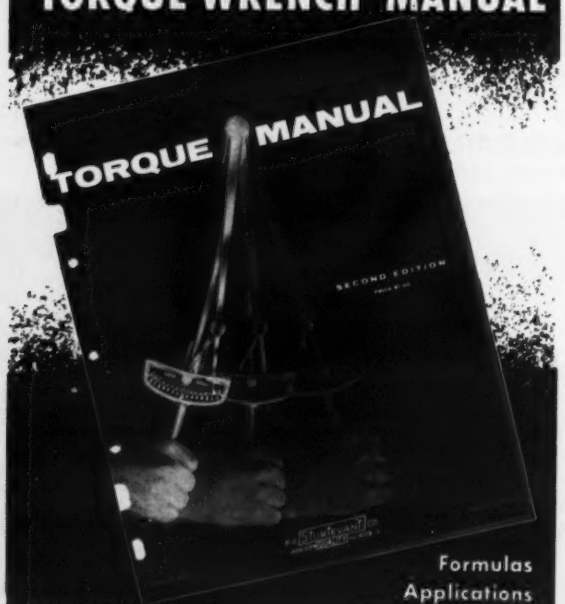
"TORQUE WRENCH" MANUAL



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More *ZOOM* for your tax dollar

Continuous extrusion process pares solid rocket propellant costs

Slowly but surely . . . the veil of secrecy is lifting from the rocket fuel manufacturing field. Security restrictions are gradually being relaxed and more and more companies are starting to publicize their operations. It is sort of reminiscent of the nuclear field just a few years ago.

A good example of the opening-door trend is the case of Atlantic Research Corporation, Alexandria, Virginia. The firm recently announced that they were taking some of the bite out of rocketry for suffering taxpayers by switching from batch to continuous processing. Their new extrusion process for solid propellants permits large-volume production at lower cost, even counting plant amortization. Because of the high throughput, plant investment per unit output is low.

Although details are still scarce, the company does say that the continuous process uses a commercial extrusion machine with slight modifications. The operation reportedly is easier to control and much more adaptable to volume production than the batch techniques previously used.

Plastisol Pays Off

Atlantic utilizes a plastisol technique to produce its solid fuel. This permits the fuel mass to be easily shaped and sized for a particular rocket application. The method is fast and requires only a relatively small plant.

The technique permits substitution of additives, high-energy ingredients, binder compositions, and oxidizers to serve different rocket requirements without significantly altering the other properties of the propellant. Burning rate may be changed by factor of 10 by modifying the burning rate additive.

The plastisol used in the process is a dispersion of polyvinyl chloride resin particles in a plasticizer. When heated to about 350°F, it fuses into a tough, rubbery material. This holds the other components (ammonium perchlorate and aluminum powder) in a homogeneous mass. Result: A mud-like slurry is converted into a powerful, extremely reliable solid fuel propellant.

When ignited, the PVC reacts with the ammonium perchlorate to produce a powerful thrust. The aluminum powder in the mixture also ignites and adds to the power output.

The rocket fuel is turned into its final form by means of a casting process. Raw

After being removed from the casting mold, the solid propellant is trimmed to fit the particular rocket that it will be used in

mix is put in a mold which is steam heated through the outer jacket and, usually, the inner mandrel. The mold shapes the mix to the design required for a particular rocket.

At the proper time, remotely-operated valves shut off the steam and start cooling water. The formed propellant is then removed, trimmed and prepared for use.

Although Atlantic has been making rocket propellant for a number of years, parts of its program have only recently been declassified. The fuel powers several rockets, among which are the Arcon and Arcas, high-altitude meteorological probes, as well as the PET (for propellant, experimental test) a pocket-size rocket engine that performs spin and retro functions on the larger rockets and missiles.

(Plastics used in the manufacturing process are based on Bakelite vinyl chloride resins made by Union Carbide Plastics Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, New York).

Check 3397 opposite last page.

Compact fluid coker costs 1/3 less to operate

Greater efficiency in less space and at 1/3 less cost is being realized with a "compact model" fluid coker. The new design features a lower silhouette and occupies minimum floor space.

For example, the coke burner — the largest diameter vessel — which supplies heat to operate the process, has been made 30% lower in height. Utility costs can be cut up to 35% by using a waste gas turbine to drive the burner air blower and by other operating economies, including elimination of externally provided high pressure steam.

Simplication has also been built into the feed and recycle systems. Number of reactor feed nozzles has been reduced

Protect Metals Against Highly Corrosive Conditions...

IN ANY CLIMATE

MARKAL "D-A" COATINGS afford a lasting protection to metals from the ravages of weather and chemical corrosion, salt spray, sulfur fumes, hot acids . . . at temperatures up to 600° F. Also protects against galvanic corrosion between dissimilar metals. Easy to apply with brush or spray. Ideal for inside or outside use.

COMPLETE LINE OF MARKAL COATINGS for all kinds of extreme industrial applications . . . widely used, economical, thoroughly proved in service, dependable. Write on your letterhead for complete literature, indicate the nature of your requirements.

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New Nozzles

TAN-JET
SOLID CONE NOZZLES

Non-clogging nozzles having a uniform solid-cone spray pattern, furnished in brass, steel, 303 stainless or other suitable materials for any application or process which involves spraying of fluids. Sizes ¼"—⅜"—½" male or female conn.

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For spraying or washing inside of tubular units or other uses where a circular wide-angle spray is needed. Made in two patterns — 160° hollow-cone spray or 180° flat — circular spray. Available in brass or 303 stainless steel — others on request. Sizes ⅛" — ¼" — ⅜" male conn.

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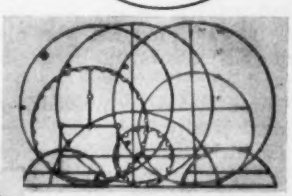
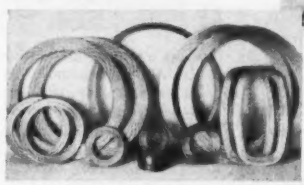
RING GASKETS For ring-type flanged joints in high-pressure lines. Made of soft iron, standard steel alloys or any non-ferrous metal to any desired cross section. Ask for Bulletin 563.





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67% and certain heat exchangers and pumps have been eliminated. In all, more than 50 design details have been improved.

(Further information about compact fluid coker, which is available to industry under license arrangement, may be obtained by contacting Esso Research and Engineering Company, P. O. Box 121, Linden, New Jersey.)

Shrinking plastic film opens way for new packaging methods

Polyethylene film that shrinks is resulting in the development of new packaging techniques for the food field. Ideally suited for wrapping fruits and vegetables, meat

Closed circuit television is used to monitor the polyethylene tape as it is irradiated by the electron-beam generator

and poultry, bakery and confectionery products, the film literally draws itself to the product.

The tight fit, combined with high clarity and gloss imparted in the stretching process plus the film's high strength (six to eight times that of conventional polyethylene), make for packages that ship without breakage and display well regardless of temperature or humidity.

In the manufacturing process, an electron-beam generator is used to irradiate the polyethylene tape. As electrons hit the tape, the high energy beam causes molecules to become unstable and crosslinked. This boosts strength of the tape by more than 500%. It also makes it

See why ALCOA ALUMINUM makes a good design habit

Requirement: metal pipe and tube to insure corrosion-free fluid handling at low initial cost and minimum upkeep

Key to good design: specify low-cost, trouble-free tubular products of Alcoa Aluminum

The overpowering volume of pipe and tubing needed in the process industries makes it one of the biggest single material investments in most plants. Historically, the repair, maintenance and replacement of piping systems has been too, one of the biggest causes of an alarming increase in maintenance costs. Both factors make vital a clear understanding of the rather remarkable advantages of aluminum pipe and tube.

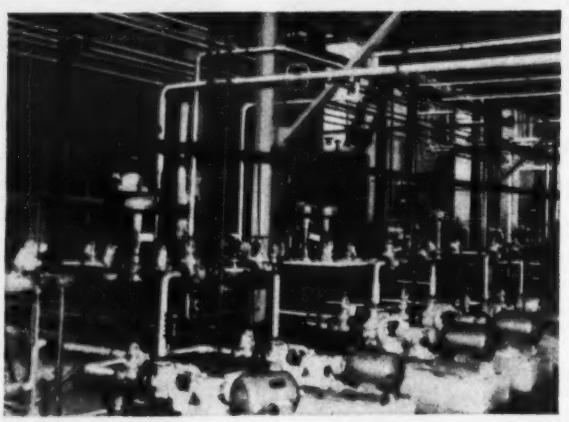
First of all, from a cost standpoint, aluminum is very frequently the lowest cost material suitable for a wide variety of applications in moving fluids through a plant. Consider, for example, the fact that the initial cost of aluminum may often average as much as 50 per cent less than that of admiralty for identical applications. Even greater savings apply when other metals such as stainless or mild steel are compared with aluminum.

Beyond these initial cost savings, aluminum provides significant maintenance benefits. For instance, no other commonly used metal offers aluminum's great resistance to corrosion. And the corrosion resistance for specific alloys exposed to particular environments can be determined from a substantial body of factual service data accumulated by ALCOA over the past 40-odd years.

It is hardly surprising that aluminum, in a variety of tubular forms, is gaining the confidence of more and more designers and builders in the process industries . . . as suggested by the aluminum applications described on these pages. ALCOA's engineers are anxious and willing to share their factual knowledge of aluminum which inspires this confidence. They are doing so through a series of engineering conferences being held this year in major cities around the country. Your local ALCOA sales office will be happy to furnish details.

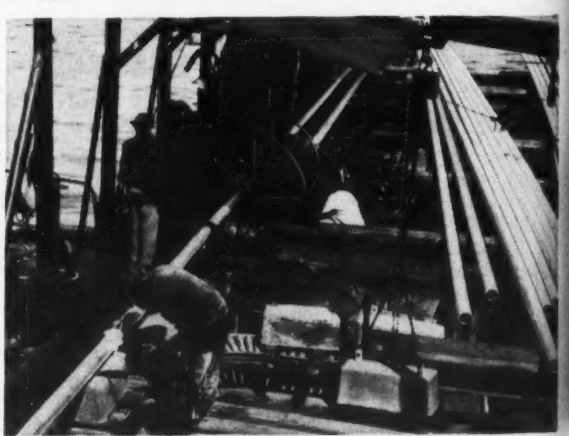
You may also wish to avail yourself of the body of ALCOA literature which describes in technical detail the known performance characteristics of aluminum in a variety of process industries applications. Simply fill in and mail the coupon opposite.

World wide sales through ALCOA INTERNATIONAL, INC., 230 Park Avenue, New York 17, N.Y.



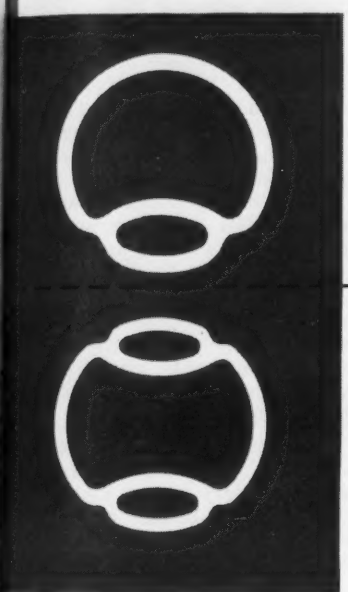
Process piping of Alcoa Aluminum is shown here in a system designed to handle liquid sugar. The natural corrosion resistance of aluminum prevents contamination of the syrup, insures long service life and prevents excessive maintenance. Its scavenging action reduces undesired heavy metal contamination, thereby improving the end product. And aluminum's low friction factor permits fast flow without excessive pumping costs.

This aluminum pipeline is shown being welded and laid in Lake Maracaibo, Venezuela. Aluminum—without special coatings—has proved highly suitable for this operation because it resists so well the corrosive attack of the brackish waters in the lake. Since no coating is required, the low initial cost of the aluminum has proved a significant benefit. The light weight of the aluminum pipe speeded laying operations, and it has no vulnerable coating which would require babying the pipe.



Alcoa Aluminum jacketing keeps the thermal insulation on these large diameter steam lines fully effective. The light, bright aluminum jacketing shields over 5½ miles of piping and insulation from rain, snow, dirt and ice while providing effective protection against a highly corrosive industrial-marine atmosphere.

New UNISTRENGTH® pipe by Alcoa now makes it possible to design low-cost welded aluminum lines with uniform bending, bursting and tensile strength throughout their length. The secret is a reduction in wall thickness everywhere but at the ends where it is needed to overcome the local reduction in strength caused by the heat of welding. The result is aluminum piping which weighs up to 40% less but provides equivalent design strength.



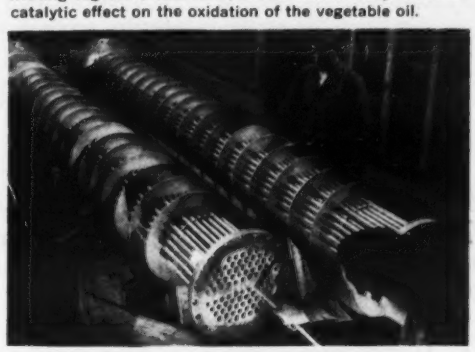
Alcoa UNITRACE® is the light, strong, corrosion resistant pipe which provides steam and product passages in a single extruded unit. It has proved an excellent way to cut cost and improve the efficiency of steam traced lines—by eliminating costly external steam jackets or inefficient tracer tubes. Now a new product,

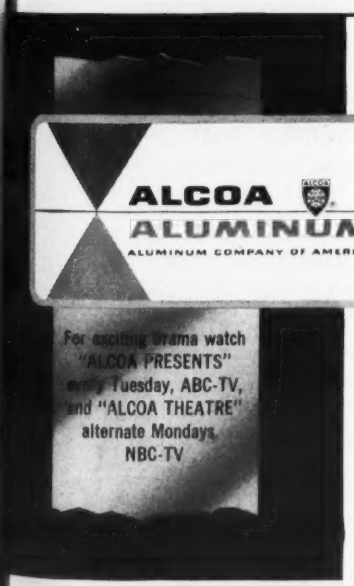
Alcoa DUOTRACE* makes possible the same important benefits in steam traced systems where recirculation is desirable. As shown, DUOTRACE provides two trace passages plus the product passage in one extruded unit. Flange and Trace Cap fittings compatible with conventional piping are available for both UNITRACE and DUOTRACE.

Design Note: Consider UNITRACE and DUOTRACE as low-cost successors to both heat exchangers and preheaters.

*Trademark of Aluminum Company of America

Alcoa Aluminum heat exchanger tubing is frequently the lowest cost material with suitable corrosion resistance for a variety of heat transfer applications. Moreover, aluminum frequently displays significant extra benefits—as in this pair of aluminum oil-to-oil exchanger bundles for preheating vegetable oils. Here, the aluminum alloys have no catalytic effect on the oxidation of the vegetable oil.





Aluminum Company of America, 872-G Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries:

- ☐ 10197 Aluminum Pipe and Fittings
- ☐ 34-10418 Alcoa Unitrace: Combines Piping and Tracing in One Unit
- ☐ 10270 Alcoa Utilitube
- ☐ 10460 Process Industries Applications of Alcoa Aluminum
- ☐ 20849 Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres
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- ☐ 20437 Aluminum Alloy Heat Exchangers in the Process Industries
- ☐ 20272 Aluminum Alloys for Handling High Purity Water
- ☐ 21090 Resistance of Aluminum Alloys to Fresh Waters
- ☐ 10130 Forming Alcoa Aluminum
- ☐ 19416 Brazing Alcoa Aluminum
- ☐ 19415 Welding Alcoa Aluminum
- ☐ 19051 Alcoa Aluminum Handbook

Name_____

Company_____

Title_____

Address_____

City_____

State_____

Check 3401 opposite last page.

possible to stretch the material in both directions more than 200%.

After stretching the film is wound on rolls. It may be printed and slit to size and specification for any packaging application.

When exposed to hot air or water at 180°F, the film shrinks by about 20%. It continues to shrink as the temperature is increased until it returns to its original size.

During marketing tests, more than a million pounds were used for wrapping meat and poultry products. Price of the film was 3¢ per 1000 square inches, which is comparable to other packaging films.

(Further information about Cryovac Type L film may be obtained from Cryovac Division, W. R. Grace & Co., 3 Hanover Square, New York 4, New York.)

Check 3402 opposite last page.

Slide rule specializes in chemical problems

Also performs multiplication and division

Slide rule has been developed that solves problems involving concentration of solutions and relationship of pressure, volume and temperature of a gas. Calculations can be made with only one setting, making it possible to solve problems with speed and accuracy.

The device can also be used to calculate the composition of liquid and vapor phases in a mixture of two volatile liquids. Standard scales for conventional multiplication and division are also included. Rule measures 10½ x 3". It is made of vinylite plastic.

(Rule may be obtained by remitting $10.00 direct to Dyna-Slide Company, 600 S. Michigan Ave., Chicago 5, Ill.)

BEFORE

Mockup of large stainless steel valve.

AFTER

Specially designed and tailored Glas-Col heating mantle in place on valve.

Glas-Col tailors special heating mantles for complicated applications

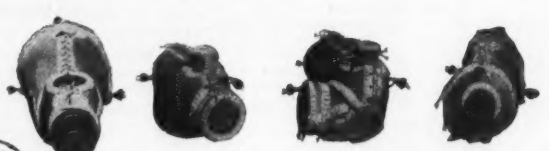
PROBLEM: A processing plant desired to obtain an extremely high vacuum within a large valve similar to the mockup shown above. Heat was required to remove adsorbed moisture from the inner surface of the valve.

SOLUTION: The processor built a mockup of the valve and shipped it to Glas-Col Apparatus Company. Glas-Col engineers designed and tailored a special 650°C electric heating mantle for the valve.

RESULT: The high vacuum was obtained with no difficulty whatsoever.

If you have a heating problem that calls for a heating mantle of unusual design and shape, call on Glas-Col . . Glas-Col has tailored thousands of special mantles. Glas-Col Apparatus Company, Dept. CP, 711 Hulman Street, Terre Haute, Indiana.

Here are other specially tailored Glas-Col heating mantles of unusual shape:



. . the world's largest manufacturer of heating mantles

GLAS-COL ELECTRIC HEATING MANTLES

Trademark Registered U.S. Patent Office

U.S. Patents . . 2,282,078 2,739,220 2,231,506 and 2,739,221

Check 3403 opposite last page.

Chemical education program launched in grade schools

MCA booklet designed to assist teachers

Booklet of experiments, emphasizing chemical principles and designed to help elementary school teachers in their classrooms, has been published by the MCA. The publication is part of the organization's aid-to-education program started in 1956.

Experiments in the book are divided into two categories — kindergarten through the third grade, and fourth through sixth grades. Glossary of chemical terms, a simplified periodic table and a bibliography of books about chemistry for teachers and children appear in the appendix.

Public school systems as well as parochial and independent schools have been awarded allotments. Potential users of the book total more than one million.

("Matter, Energy and Change — Explorations in Chemistry For Elementary School Children" may be obtained at 50¢ per copy from Education Section, Manufacturing Chemists' Association, 1825 Connecticut Ave., Washington 9, D.C.)

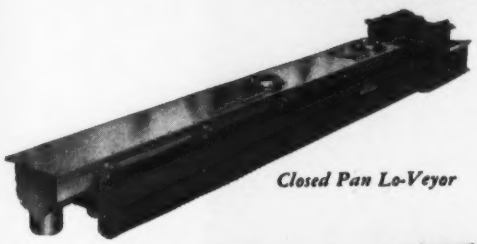
"Send Baker there . . . send Martin there . . . Wilson there . . ."

Ajax Lo-Veyor integrated into sand handling system of large automotive foundry.

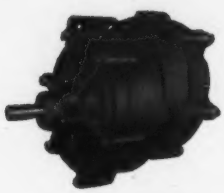
AJAX

LO-VEYORS

convey bulk materials at low cost . . .



Closed Pan Lo-Veyor



Ajax reciprocating drive, the heart of Ajax Vibrating Conveyors.

Tubular Type Lo-Veyor

FAST: Ajax Lo-Veyors take the place of shovels, wheelbarrows and other slow-moving bulk materials handling methods. They handle large tonnage in sizes from 5 microns up to large lumps and materials of various moisture contents.

CAPACITIES: Made in lengths from 3 ft. up,—they are used as feeders and for long runs with units in series. They are often integrated and synchronized with production lines between departments and machines.

LOW HEAD ROOM: Space saving installations, under floors and overhead, are made easy by low height averaging less than 14" except at point where shaker is located.

CUT MAINTENANCE COST: All idler rollers, head and tail pulleys eliminated. No lubrication problem. Operates satisfactorily in severe conditions of dust and abrasive laden air.

ENGINEERING SERVICE: The broad experience of Ajax engineers is available to give you the latest thinking in handling bulk materials. An outline of your problem will bring you some worthwhile answers.

AJAX FLEXIBLE COUPLING CO. INC.

WESTFIELD, N. Y.

Check 3404 opposite last page.

NEW LITERATURE

Ideas and New Trends

Plant tour of custom equipment manufacturer's new facilities is taken via 20-page catalog. Over 25 photographs illustrate various operations being performed. A review of engineering and design services that are available is also included. "Vulcan Columns" — Vulcan Manufacturing.

Check 3405 opposite last page.

Waste treatment processes and equipment are outlined in 24-page manual. Information is presented about activated sludge process, mechanical aeration, screening, and other operations. Manual 160 — American Well Works.

Check 3406 opposite last page.

Selective bibliography on science education and careers has been published. Compiled with the aid of U. S. Office of Education and other professional societies and government agencies, the 10-page booklet is designed for students interested in science and engineering. "Closing The Gap"—Scientific Apparatus Makers Association.

Check 3407 opposite last page.

Sludge concentrator for thickening and dewatering industrial sludges without use of chemicals is described in four-page, illustrative folder. Machine is said to need only about 1/10 the power of conventional filters. Tech Bul 100 — Nichols Engineering and Research Corporation.

Check 3408 opposite last page.

Cement plant, that uses dry process, is described in five-page reprint. Using one kiln, installation produces 1200 barrels per day. Technical Reprint, Cementos S. A.—Kennedy Van Saun Manufacturing & Engineering Corp.

Check 3409 opposite last page.

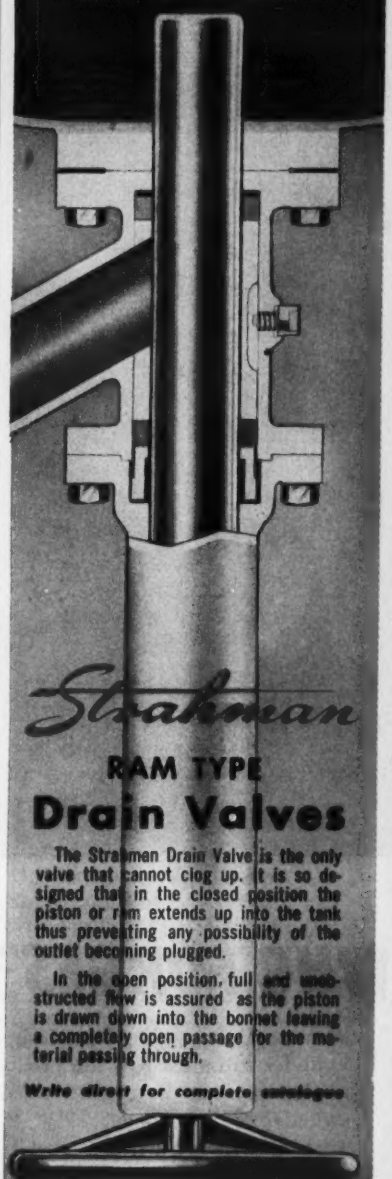
Manufacturer's facilities for the fabrication and erection of nuclear pipe are described in 24-page brochure. Emphasis is placed on welding techniques and quality Control. Bul 60-A—Midwest Piping Company, Inc.

Check 3410 opposite last page.

Nuclear activities conducted by manufacturer during 1959 are reviewed in 26-page brochure. Individual sections are devoted to nuclear power plants, isotopic power, advanced reactor systems, propulsion systems and nuclear components. "Martin-Nuclear at Work 1959" may be obtained by letterhead request to the Martin Company, Baltimore 3, Maryland.

a FLUSH BOTTOM VALVE *that* WILL NOT CLOG UP!

Designed for Chemical and Pharmaceutical Industries



Strahman

RAM TYPE

Drain Valves

The Strahman Drain Valve is the only valve that cannot clog up. It is so designed that in the closed position the piston or ram extends up into the tank thus preventing any possibility of the outlet becoming plugged.

In the open position, full and unobstructed flow is assured as the piston is drawn down into the bonnet leaving a completely open passage for the material passing through.

Write direct for complete catalogue

STRAHMAN VALVES, INC.

NICOLET AVE., FLORHAM PARK, N. J.

Check 3411 opposite last page.

WHO FORGES THE TOUGH ONES? *& machines them, too*

Assume that you've just designed a high pressure cylinder to be used in the production of high energy explosives. It is a good sized forging—the main cylinder is 50¼″ long, 31½″ O.D., and 18″ I.D.—with high physicals. It must be forged of a highly alloyed chromium nickel molybdenum vanadium steel to obtain a tensile of 164,000 psi . . . a yield point of 153,000 lbs. . . . and hydrostatic test at 30,000 psi.

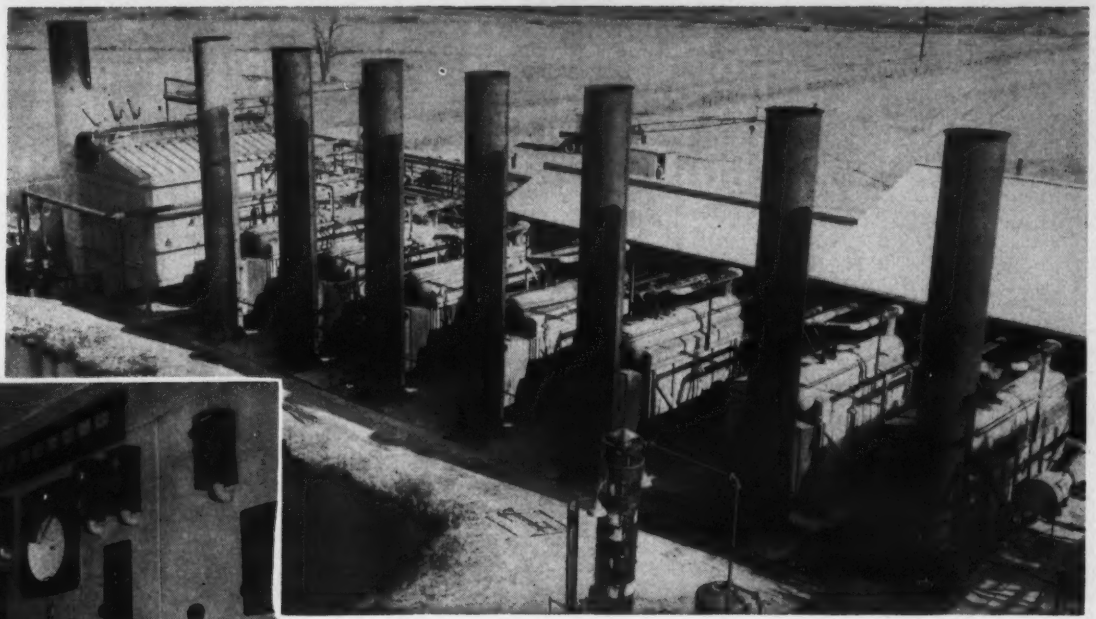
Naturally, you prefer one responsible source to do the whole job—one organization to melt the steel, forge, and finish all parts to exact prescribed tolerances.

So, call on National Forge, a company that's been producing big forgings for over 40 years—from melting steel through finish machining and protective coating (dulite, in this case) all in one completely integrated plant. Let us quote on your next job for big machined forgings—and demonstrate the answer to "who forges and machines the tough ones . . . best?

For more information on product at left, specify 3412 see information request blank opposite last page.

NATIONAL FORGE COMPANY
IRVINE, WARREN COUNTY, PA.

For more information on "the tough ones," and the machinery that makes them "best"—write for Bulletin NFO.



While two packaged steam boilers were ample for Foster Grant plant in 1954, seven packaged boilers and one field-erected boiler (left) are needed now — an indication of growth rate of the styrene monomer plant

Simplified instrumentation, which provides automatic control of boilers with complete safety, permits them to function as a unit, yet they can be individually controlled as desired

CP Staff Photo

Packaged steam boilers most economical for growing plant

Starting with two 30,000 lb/hr units in 1954, styrene plant step by step added five more as burgeoning needs dictated—efficiently using steam capacity, keeping capital costs down, retaining flexibility

GORDON WEYERMULLER, Associate Editor
with **DR. J. H. MAYES,** Technical Superintendent
and **CHARLES R. HARGRODER,** Maintenance Foreman
Foster Grant Company, Inc., Baton Rouge, Louisiana

Problem: How to install needed new plant steam generating capacity at minimum cost, yet allow for future incremental expansion.

Due to the nature of the originally conceived venture into the manufacture of styrene, Foster Grant wanted to start production on a small scale for captive consumption with increased capacity coming in step-wise progression as market outlets expanded.

Initial steam requirements for the new plant were calculated at 45,000 lb/hr.

If a field-erected boiler were initially chosen, dollars invested per lb of steam generated would be high and operations would be inefficient at reduced rates. Further, if this plan were followed, each additional field-erected boiler would be out of balance with steam requirements.

Solution: After a careful analysis of the situation, the company decided it would be better to install two, 30,000 lb/hr packaged steam boilers. Initial styrene production demand was such that both these units were needed only a few months after initial production in April 1954.

As sales for styrene monomer increased steadily, it was necessary to add a third boiler in early 1955. Following through on the originally conceived plan of step-wise expansion, a fourth and fifth 30,000 lb/hr boiler were added in 1956, a sixth in 1957, and a seventh boiler in 1958. A 120,000 lb/hr field-erected boiler was placed in service in November 1959 as this growth continued. This boiler has an air preheater for high efficiency and is base loaded for maximum fuel economy. This boiler is of the same design as the packaged units.

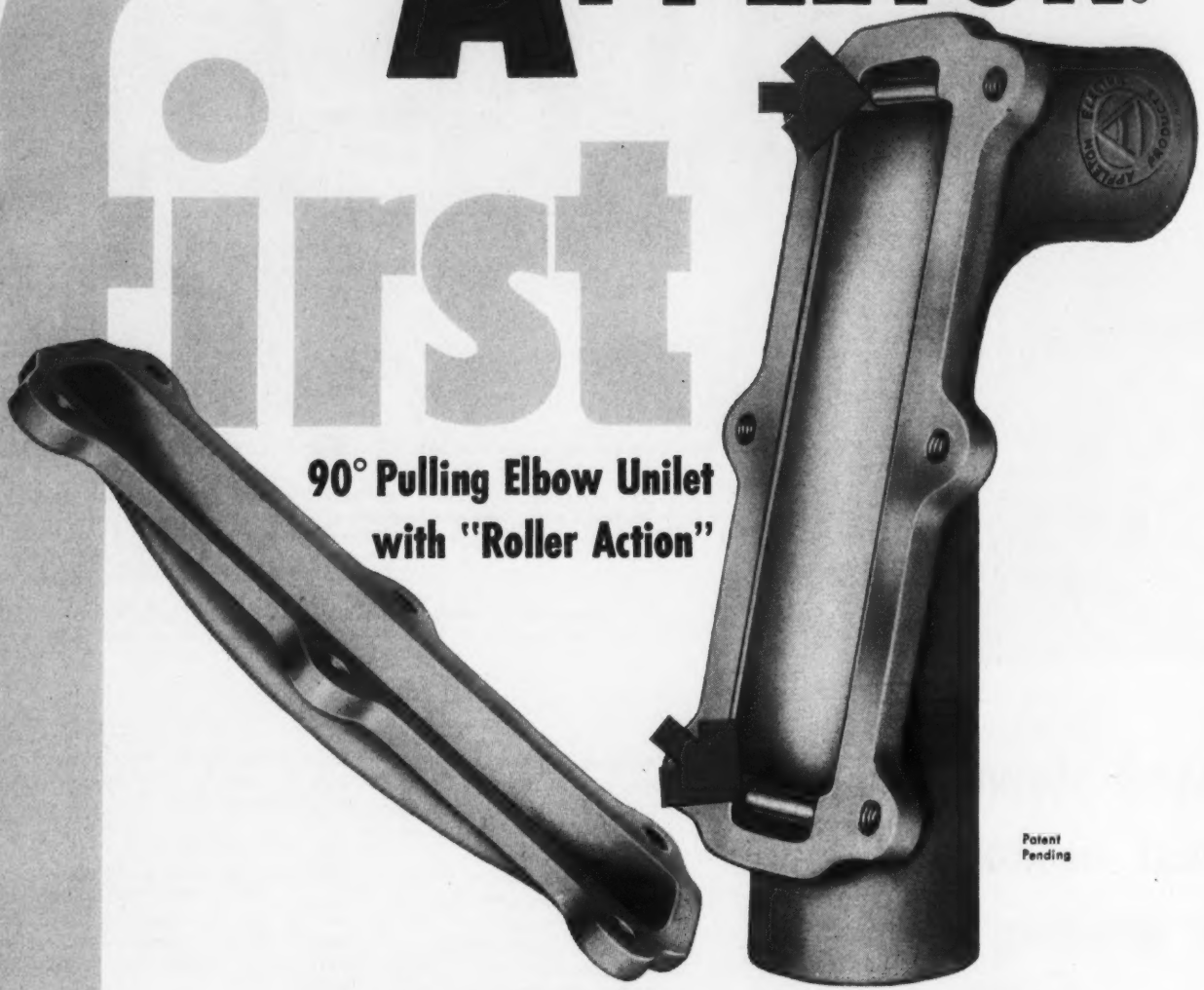
The original utility area was designed so expansion could be made as increased steam generating capacity was needed. Boiler service lines were oversized and stubbed and valved so they could be extended. The panel control board simply had to be extended and instruments mounted. This planning min-

To page 161

from APPLETON®

first

90° Pulling Elbow Unilet with "Roller Action"



Patent Pending

Explosion-Proof*, New..90° "Roller" Elbow

It's a time and cost saver for your more difficult wiring installations in hazardous locations. Large cables literally "roll through" the Appleton ELBD Unilet to give you faster, easier, lead-in wiring for motors, panel boards, circuit breakers and similar equipment.

Two, exclusive, built-in rollers guide and protect bulky cable through the chamfered hubs to complete those bulky right-angle turns WITHOUT damage to insulation or knuckles. And an all-position dome cover bolts to the precision-machined Unilet body easily, quickly to insure a totally safe, permanent, explosion-proof seal every time.

Order from your distributor now . . . Unilets available in 2½" to 4" sizes WITH ROLLERS; 1" to 2" sizes LESS ROLLERS.

Sold through franchised distributors only

APPLETON® electric company

Also manufacturers of:

*Class 1, Group D; Class 2, Groups E, F, G

1701 Wellington Avenue, Chicago 13, Illinois

WHY BORROW?

You can receive a personal copy of CHEMICAL PROCESSING every month.

Do you know that the magazine can come to you personally without charge, to your designated address?

If you . . .

would like to receive it and if you qualify, the publisher will add your name to the more than 50,000 key men in the chemical processing industries who receive each issue regularly.

The necessary qualifications are outlined on the request form that can be found opposite the inside back cover.

Fill it out, being sure to give all necessary information, and mail to Reader Service Department.

Perhaps . . .

others in your company would also like to receive CHEMICAL PROCESSING personally each month. Include their names on the form opposite the back cover.

Your application for subscription is welcomed.

For more information on product at left, specify 3413 see information request blank opposite last page.

Packaged Boilers

From page 159

imized expansion costs.

One of the outstanding features of the installation is the simplicity of the automatic controls. The eight units operate as one with the field-erected boiler base loaded and the other seven boilers not being overloaded. All units operate with complete safety.

A master pressure controller operates all eight boilers. This controller utilizes a stainless steel pressure spiral element. This controls the power cylinders that actuate forced-draft fan louvers — which vary the air-to-gas ratio to each of the seven package boilers. Biasing relays cause each boiler to fire at same rate on the seven package boilers. When air-flow changes, this automatically changes gas flow rate to maintain a constant air-to-gas ratio. On the field-erected boiler the pressure element controls the fuel gas flow, which automatically changes air flow to give a constant gas-to-air ratio predetermined by flue gas analysis.

Water level in each boiler is automatically controlled by a pilot-operated diaphragm control valve actuated by instrument on each boiler. The level indication is panel mounted. Deaerator has high and low level alarm for boiler feedwater. Deaerator pumps have running lights.

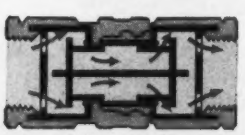
Water used in boiler is treated to keep hardness low. Each boiler has its own blowdown which can be manually adjusted. Blowdown of 3 to 6 gpm from each boiler is continuous. Rate depends on analysis of silica content, which is kept at 5 ppm or less.

All boilers have twin pressure relief valves — set about 5 psi apart at 455 and 460 psig. All boilers also have Fireye safety equipment. This consists of automatic ignition and fire failure safety gas shutoff. Thus, all possible hazards are minimized.

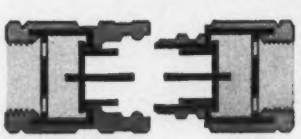
Results: Full utilization of steam capacity, efficiency, and economy have been achieved with packaged steam boilers

There's a size and type to handle almost anything that flows

TO USE SNAP-TITE VALVED COUPLING:



CONNECT—Full flow instantly



DISCONNECT—No flow instantly

Snap-Tite can provide the right size valved coupling for most any use . . . with quick off-on action wherever coupling or shut-off is required.

"H" series valved couplings for high pressure applications. High resistance to heavy line surge. Sizes from ⅛" through 6". Larger sizes on special order.

"IH" series valved couplings for greater impact in air lines. ⅛" through ½".

"E" series valved couplings for vacuum and very low pressure. Recommended for gravity flow. Sizes from ⅛" to 6". Larger sizes on special order.

"T" series valved couplings for hard to handle fluids. The only valved quick-disconnect couplings now on the market for fluid temperatures from −40°F to +400°F. Sizes from ½" through 3".

Snap-Tite valved couplings are available with two-way or one-way automatic line shut-off. They are normally furnished in alloy steel. Also available in brass, aluminum, or stainless steel with a variety of finishes.

Write for Snap-Tite Catalog No. 58 for more information on Snap-Tite valved couplings.

Snap-tite
UNION CITY, PA.

ST-60-C2

Check 3414 opposite last page.

at Foster Grant. They have been particularly well suited to the growing plant. Capital expenditures for steam capacity have been kept at a minimum.

Operation of boilers has been highly satisfactory. No mechanical trouble has been experienced with instrumentation. Operation is felt to be safe and dependable.

(Packaged steam boilers and 120,000 lb/hr field-erected boiler are products of Power Division, Bros Boiler and Manufacturing Company, Minneapolis 14, Minn.)

Check 3415 opposite last page.

Filter can be cleaned without contaminating product lines

Filter design which allows for removal when cleaning of the element while keeping pipe lines uncontaminated is now available. Simple clamp

Filter can be used with or without a filter aid

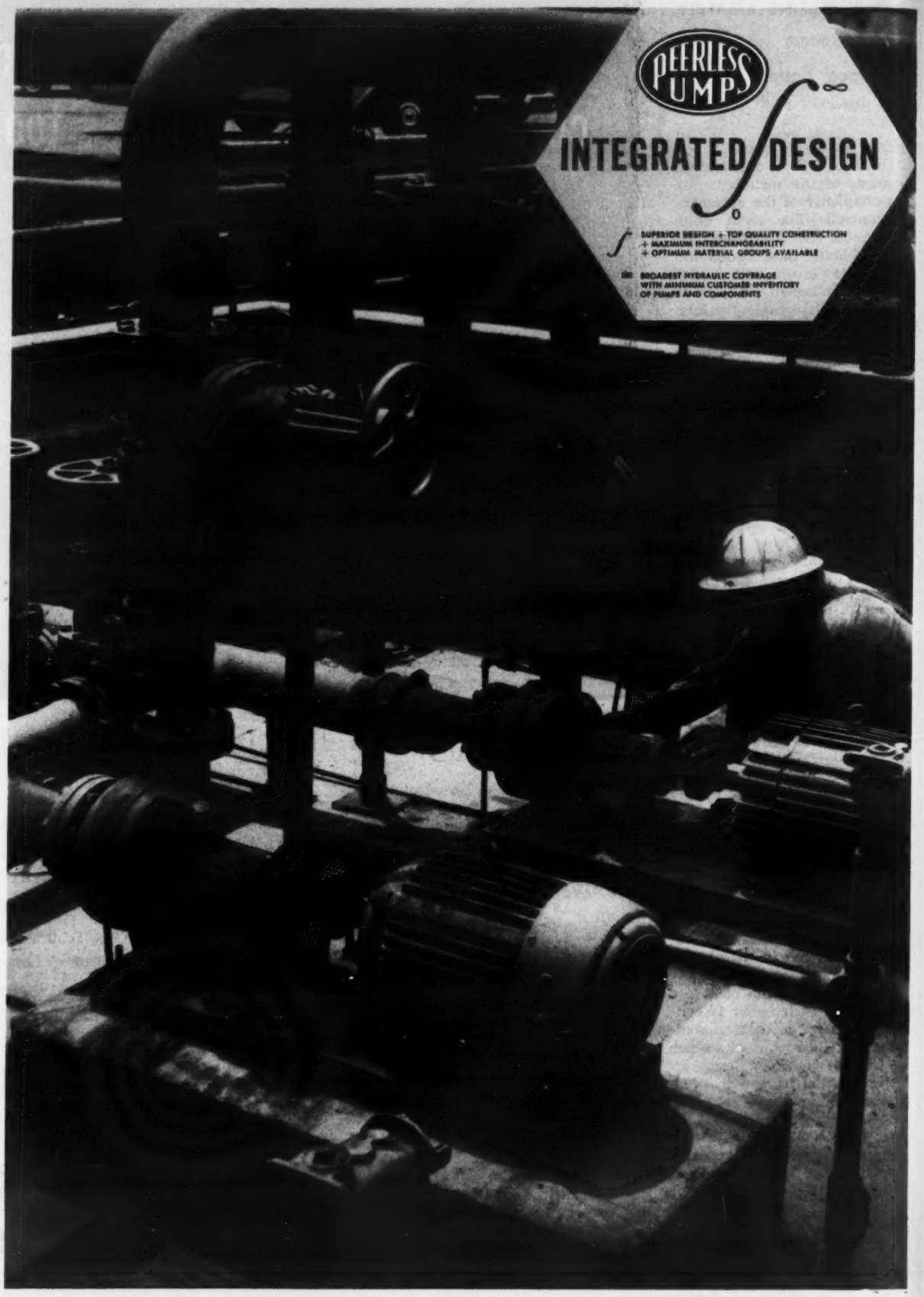
closure permits removal of the body tube, cleaning and reinstallation in minutes.

Filter comes in several pipe sizes. It contains a porous metal element which can be used with or without a filter aid. Elements are available in stainless steel, Monel, nickel, Inconel and others on special order.

Standard unit will withstand 125 or 300 psig. It can be designed to withstand up to 10,000 psi. Filtration is available to as low as 2 microns nominal.

(Filter is product of Micro Metallic Div., Pall Corporation, Glen Cove, N.Y.)

Check 3416 opposite last page.



CAN CUT YOUR PUMP INVENTORY COSTS AS MUCH AS 85%

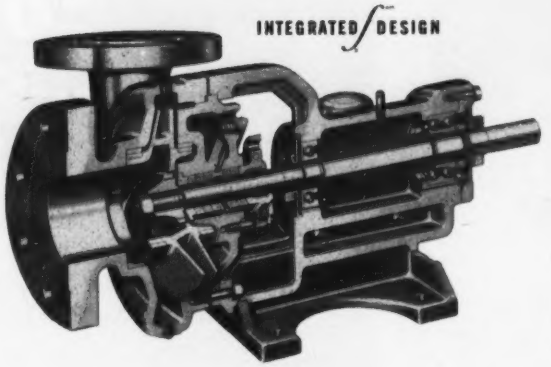
Maximum interchangeability means far fewer parts required to fill all your day-to-day needs.

The effectiveness of integrated design of Peerless Type DL and DM process pumps can probably best be shown by a recent customer's order. This customer purchased 150 process pumps for his plant. Of the group, 120 have interchangeable parts. As a result, pump inventory of spare parts can now be cut to a fraction of former requirements freeing important dollars for many other uses. And with the greater interchangeability, the customer predicts even more savings because of speedier maintenance work and less time lost waiting for proper parts.

And, if interchangeability of Peerless Type DL and DM pumps captures your interest, please remember this fact. Because Type DL and DM pumps are of integrated design, you can order them out of stock just the way you need them. For example, there is a choice of semi-open or enclosed impellers; water or air cooled backplates; oil or grease lube bearing housing; packing or mechanical seals; and liquid ends of any machineable metal.

There is one more point to be told about these pumps. They are real performers. Proven time after time, they efficiently pump virtually all liquids used in the process industries.

INTEGRATED ∫ DESIGN



VERSATILE IS THE WORD FOR THIS PEERLESS DL—DM PROCESS PUMP

The Peerless Type DL and Type DM process pumps will handle virtually all liquids used in the chemical, process and refining industries. Both models are single stage, single suction centrifugal types with a vertically split case, and both models have capacities to 1000 gpm, heads to 430 feet and working pressures to 300 psig. Type DL models have a temperature range of 250°F, while the Type DM models have a range of 450°F.

FOR EXAMPLE: WITHIN FIVE DIFFERENT SIZE PUMPS THESE 22 PARTS ARE INTERCHANGEABLE—

1. Shaft
2. Back plate
3. Packing rings
4. Radial bearing
5. Packing gland
6. Thrust bearing
7. Pump frame
8. Impeller lock nut
9. Bearing lock nut
10. Seal lantern packing
11. Key
12. Thrust plate
13. Water slinger & set screw
14. Lockwasher-bearing
15. Gasket-volute case
16. Gasket-thrust plate
17. Oil retainer plate
18. Oiler: constant level
19. Lockwasher-impeller
20. Gland clamp
21. Splash plate
22. Retaining ring bearing

INTEGRATED ∫ DESIGN FOR GREATER EFFICIENCY AND SAVINGS

PEERLESS PUMPS

Putting Ideas to Work

fmc FOOD MACHINERY AND CHEMICAL

Peerless Pump HYDRODYNAMICS DIVISION

Offices:
New York; Detroit; Cleveland; Chicago; Indianapolis; St. Louis; San Francisco; Atlanta; Plainview; Lubbock; Phoenix; Albuquerque; Los Angeles; Fresno.
Distributors in principal cities.
Consult your telephone directory.

Peerless Pump, Hydrodynamics Division, Food Machinery & Chem. Corp.
301 West Avenue 26, Los Angeles 31, California
Send me Bulletin B-1608 ☐ Have field engineer contact me ☐
Company_____
Name_____
Address_____
City_____ State_____
CP

Check 3417 opposite last page.

Safety Slants

Water, water, everywhere

. . . on face is result of using emergency eye- and face-wash fountain which contains 360° spray ring. It incorporates six broad-coverage spray jets to bathe face and eyes.

Spray jets are activated when large push valve is moved. Valve stays open until manually closed, leaving hands free to assist in first aid. Water coverage is over 95-sq-in area. Jets deliver 8 to 10 gpm on 10 psi flow pressure.

(Face-wash fountain 7900 is product of Haws Drinking Faucet Company, Fourth & Page Streets, Berkeley 10, Calif.)

Check 3418 opposite last page.

On-the-spot resuscitation

. . . is the order to the day with this mouth-to-mouth resuscitator which now comes in red fiber case for easy transportation into field. Case is fitted to hold securely resuscitator assembly, airway, aspirator and instruction card.

(M/M resuscitator is product of Globe Industries, Inc., 125 Sunrise Pl., Dayton 7, Ohio.)

Check 3419 opposite last page.

Vogt

GENERAL GP PURPOSE

Gate, Globe and Check

VALVES

featuring:

HENRY VOGT MACHINE CO., BOX 1918, LOUISVILLE 1, KY.

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J. St. Louis, Charleston, W. Va., Cincinnati

Vogt GENERAL GP PURPOSE FORGED STEEL VALVES

Check 3420 opposite last page.

Heaviest walls ever

. . . forged in pipe fitting this diameter (9-1/3″-ID) are believed to have been made for this alloy-steel elbow. Walls are 4-½″ thick. They are designed to contain super-heated steam at more than 1000°F at 2000 psi. Elbow is slated for use in one of world's largest power plants.

(Alloy-steel elbow is product of Tube Turns Division, Chemetron Corporation, Box 987, Louisville, Ky.)

Check 3421 opposite last page.

Drawings are microfilmed at 1200/hr rate

Uses: Microfilming engineering drawings and other printed matter.

Features: Machine can microfilm 1200 engineering drawings per hour.

Description: Microfilming machine continuously feeds drawings from pile, registers them, conveys them under camera, adjusts illumination to proper level, photographs drawings, and discharges them to delivery pile.

Sheets to 22 x 34″ are handled by machine, as well as roll drawings to 42″ in width. Design modifications may be made to suit other conditions.

Focusing of camera, exposure control, and programming and monitoring of all phases of operation are remotely accomplished from control console. Resolution obtained with camera is equivalent to 130 lines/mm at center of drawing and 110 lines/mm at corners. Camera accommodates 1000′ rolls of 35-mm film.

(Microfilming machine is product of de Florez Company, Inc., 200 Sylvan Ave., Englewood Cliffs, N. J.)

Check 3422 opposite last page.

THAT'S INTERESTING

$35/yr runs electric car

Electric cars and trucks are latest entry on changing automobile scene.

Out of style for many years, electrics are being touted as ideal second car and for delivery routes.

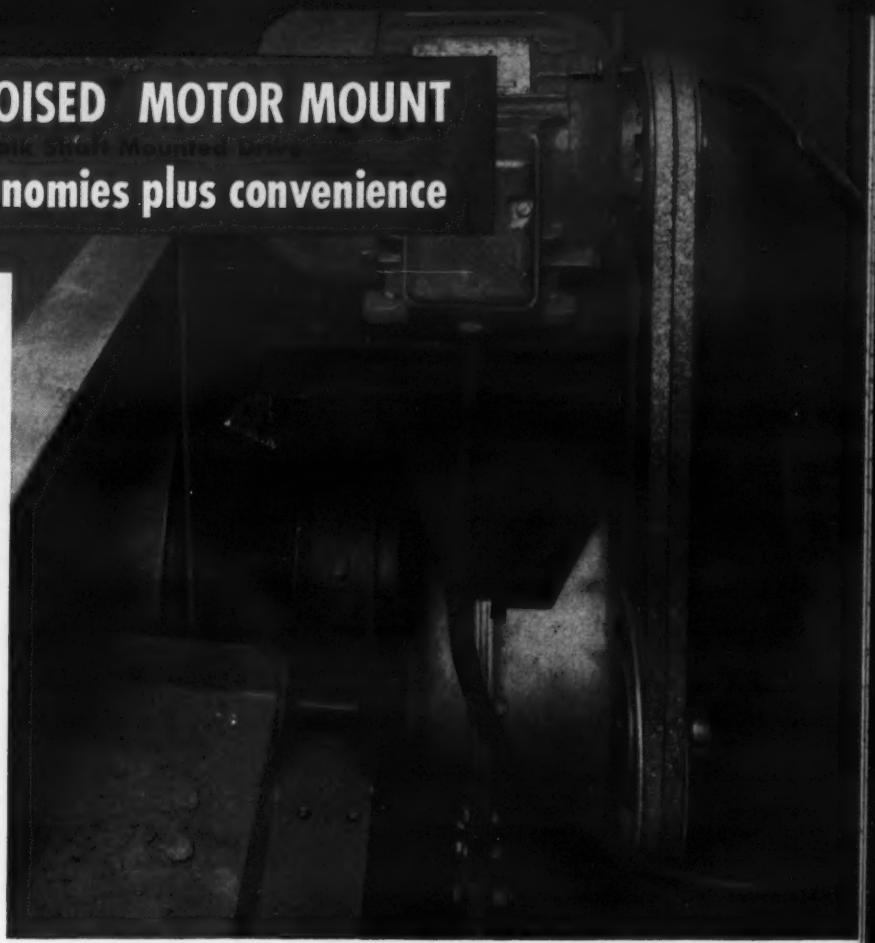
Limited in range, they can be operated for about 5¢ a mile as compared to 8½ to 9¢ for gasoline-powered vehicles; require little or no maintenance; and depreciation, spread over 20-yr life, is low.

Initial cost is higher—about $3,000 more for electric truck. NuKlea Automobile Corp., Lansing, Mich., expects to have sports car on market this year. Phototype trucks of Cleveland Vehicle Electric Truck Co. are being tested by Cleveland, O., dairy and post office.

For more information on product at right, specify 3423 see information request blank opposite last page.

NEW FALK EQUI-POISED MOTOR MOUNT

gives unequaled economies plus convenience

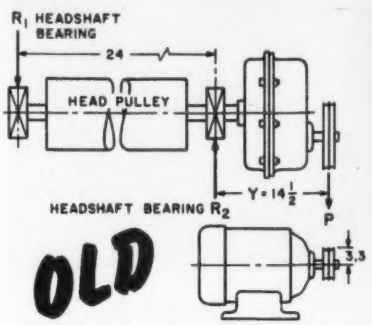


HOW A FALK EQUI-POISED MOTOR MOUNT REDUCES BEARING LOADS ON A DRIVEN MACHINE

GIVEN: Motor—15 hp, 1750 rpm, Frame 284U, Weight—320 lb. Sheave diameters—6.6/9.4 Driven machine—belt conveyor with 24″ center distance between headshaft bearings.

NOTE: Weights of 307J24 Shaft Mounted Drive, sheaves, and V-belts are eliminated from calculations because they remain constant; do not affect the comparison.

WITHOUT FALK MOTOR MOUNT



Torque at motor shaft = $\frac{63{,}025 \times 15 \text{ hp}}{1750 \text{ rpm}}$ = 540 lb-in.

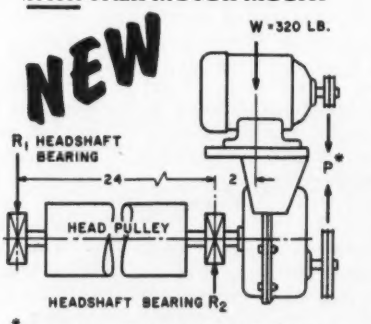
Belt pull (P) = $\frac{540 \text{ lb-in.}}{3.3''}$ x 1.5 Load Connection Factor = 246 lb

$R_2 = \frac{246 \text{ lb} \times (24'' + 14.5'')}{24''} = 395 \text{ lb}$

$R_1 = \frac{246 \text{ lb} \times 14.5''}{24''} = 149 \text{ lb}$

(Check: 395 lb—149 lb=246 lb)

WITH FALK MOTOR MOUNT



*P = ZERO REACTION AT HEADSHAFT BEARINGS

V-belt pull has zero reaction on headshaft bearings. Therefore—

$R_2 = \frac{320 \text{ lb} \times (24'' + 2'')}{24''} = 347 \text{ lb}$

$R_1 = \frac{320 \text{ lb} \times 2''}{24''} = 27 \text{ lb}$

(Check: 347 lb—27 lb=320 lb)

Falk's new EQUI-POISED* Motor Mount is a rigid, all-steel weldment, pre-drilled for bolting standard NEMA foot-mounted motor (1/2 to 30 hp) directly to the steel frame of Falk Shaft Mounted, Flange Mounted and Screw Conveyor Drives. With it, motor can be mounted in almost any position around perimeter of reducer.

*(*Balancing of forces.)*

Substantial Savings for You

It saves engineering time required to design special motor bases and foundations...saves cost of labor and materials required to build special motor foundations...and saves on equipment costs by using a quality stock component. Further, its quick installation and easy maintenance mean added cost savings. The Motor Mount is a space saver, too. Where restricted space is a factor, ability to mount motor in any of several positions is an important convenience...For information on range of sizes, dimensions, etc., contact your Falk Representative or Distributor—or write direct for Bulletin 7100.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

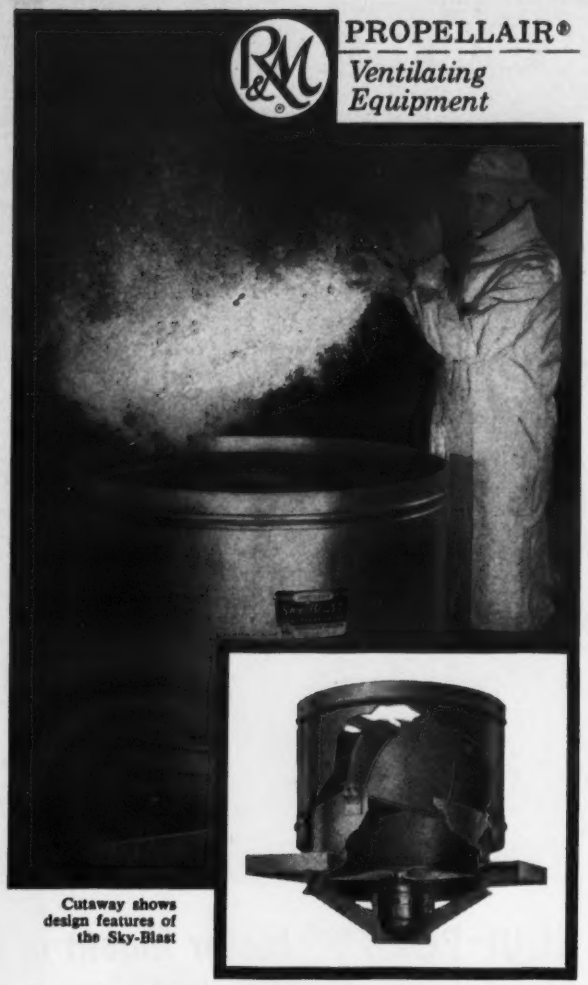
FALK

...a good name in industry

Representatives and Distributors in most principal cities

FALK is a registered trademark

PROPELLAIR®
Ventilating Equipment



Cutaway shows design features of the Sky-Blast

Free-Flow SKY-BLAST® Roof Ventilators are *WEATHERPROOF!*

Even if the rain comes down in buckets, there's no need for weather covers on SKY-BLAST roof ventilators. In operation, the powerful airstream keeps out snow, rain and sleet. At rest, butterfly dampers form a water-tight seal, won't leak a drop. With no interfering covers, more air is moved at less cost. Fumes are thrown high in the air to prevent re-entry into the building and to eliminate roof maintenance problems created by other types of ventilators. Wind velocity or direction can't affect performance. Heavy gage steel surfaces are hot-dip galvanized for real sou'wester protection. With patented, non-clogging rainshed, low wind guard, rugged base and condensate drain, it's always fair weather beneath a SKY-BLAST. Wind tunnel proven ratings to 78,000 cfm. Send for bulletin 680—CP

PROPELLAIR®
Div. of Robbins & Myers, Inc., *Springfield, Ohio*

DIRECT CONNECTED · SKY-BLAST® ROOF VENTILATOR · TUBEAXIAL and VANEAXIAL · EXTENDED SHAFT · BELT DRIVEN · MAN COOLERS

MOVING AIR IS OUR BUSINESS®

Check 3424 opposite last page.

PLANT ENGINEERING MAINTENANCE & SAFETY

In handling system, explosion-proof pneumatic elevating truck is utilized to raise and lower ink-filled drums to four-wheeled dollies. Dollies are used to move drums to and from production area

Open-ink-drum handling change brings triple benefit —

- **Safety hazard eliminated**
- **Handling bottleneck broken**
- **Storage squeeze alleviated**

Problem: Moving open-top 55-gal drums of printing ink from storage to production areas with portable crane hoist fostered safety hazard, production bottleneck and storage-space squeeze at Columbus Coated Fabrics Corp. in Columbus, Ohio.

Safety hazard existed because open drums of solvent-base printing ink of both nitro-cellulose and vinyl types were not being stored in explosion-proof area. Handling drums by means of portable crane hoist slowed delivery rate to production area to point of drawing complaints from production workers paid on incentive basis. Also, use of hoist restricted storage to single height only, thus crowding storage area.

Solution: In attacking problem, first step was construction of explosion-proof storage room for ink drums. Only available space convenient to production facilities was between two railroad sidings. Here, long narrow building was constructed to explosion-proof specifications.

In building, large blow-out windows were incorporated. These are designed to quickly release pressure in event of explosion. Sprinkler system, explosion-proof lighting, automatic fire doors and positive-pressure air-circulation system were all included. Double-deck racks were installed to take maximum advantage of storage space.

Completion of this project solved storage and safety aspects of problem. How-

ever, handling bottleneck was, if anything, aggravated. Layout of building provided for four-ft aisles, but drum spigots overhang aisles by as much as 10 to 11". Furthermore, since storage area was designed to be explosion-proof, any material-handling equipment employed could not be electric- or gas-powered. Finally, storage of drums on two levels instead of one created potential splash problem heretofore non-existent.

Pneumatic Elevating Truck Solves Handling Problem

After a successful trial of foot-operated portable elevating truck with drum-stacker attachment, manufacturer designed pneumatic explosion-proof unit to raise and lower drums from shelves. In this set-up, drums are placed on four-wheeled dollies for transportation to and from production area.

The 1500-lb-capacity truck is double-stacking and non-telescopic. Although stacker is non-straddle unit, drums fit within 25" clearance between outriggers.

In truck, air motor is utilized to drive hydraulic pump for lifting ram. Hand-operated control valve regulates raising or lowering of drums. Truck maneuverability was maintained by location of push-pull compressed-air hose connections every 10 to 12'. Air-line pressure as low as 50 psi operates lifting system through 15' length of flexible hose.

Results: Construction of explosion-proof storage room incorporating double storage tiers and utilization of pneumatically operated elevating truck has successfully eliminated safety hazard, broken production bottleneck and alleviated storage-space squeeze. System has proved so successful that company has decided to convert another ink-storage room to similar system.

Lift truck pulls full drum up or down in approximately

NATIONAL AIROIL BURNER

ENGINEERING NEWS

NATIONAL AIROIL BURNER CO., INC. • 1284 E. Sedgley Ave. • Philadelphia 34, Pa.

You may wish to check certain items in this advertisement and forward to those concerned in your company.

ROUTE TO:

_____

_____

_____

_____

National Airoil Offers Broad Line of Oil and Steam Hand Firing Valves

We are often asked to suggest the correct valves for regulating oil and steam supply to burners in petroleum and chemical industry applications. Initially, consideration should be given to the grade of oil, its composition, viscosity, temperature and pressure at the burner. For atomizing steam supply, it is important also to know the pressure, quality or total temperature.

National Airoil Bronze Valves are suitable for medium pressures and temperatures. The National Airoil 232 "V" port all-bronze plug valve is recommended for oil temperatures up to 225°F and 75 pounds pressure. This valve is also ideally suited for acid sludge. The National Airoil 231 all-bronze globe valve is recommended for atomizing steam pressures of up to 150 pounds gage or a total temperature not in excess of 375°F. Although bronze valves are the lowest in cost, they are not commonly acceptable to oil refineries where steel is the standard material for all steam and oil piping.

National Airoil Steel Valves Where high temperature oil as asphalt or vacuum tower bottoms is burned at up to 600°F or pressures up to 400 pounds, we recommend our 9847 steel valve with stainless trim. This valve is a globe type, "V" port, close regulating, it is non wire-drawing. The oil supply should be reasonably clean or free from larger particles of coke that might build up in the port.

In those instances where high temperature oil, containing particles of coke is fired, the National Airoil all steel, "V" port, 9195 plug valve can be used. Although it is not entirely free from port clogging by coke, it can be easily cleared by momentarily opening it wider to flush through any coke build up. This valve is generally not considered as a positive shut off, it should therefore, be provided, up stream and in series, with a suitable shut off valve. This practice should also apply to all oil and steam control valves.

When superheated steam of up to 600°F total temperature and pressures up to 200 psig is the atomizing medium, the better valve is the National Airoil 9077 with steel body and stainless stem.

All valves described above are fitted with pointed handles and a graduated indicating device.

Bulletin 90 contains complete details on the broad line of National Airoil Valves. May we send you a copy?

Check 3425 opposite last page.

Do You Have These National Airoil Technical Bulletins In Your Library?

Whatever your industrial heating problem, you'll find a wealth of helpful information in these technical bulletins. Write for any or all of them today.

BULLETIN No. 40. FUEL OIL PUMPING AND HEATING UNITS

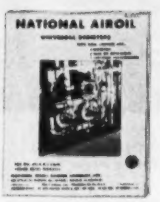
16 pgs. Here's the answer to problems involving preparation of heavy fuel oil for combustion. Single and duplex units, from 2 to 100 gpm in standard or special models.

BULLETIN No. 28. AUTOMATIC PACKAGED FIRING UNITS

4 pgs. Steam atomizing automatic firing units for oil and/or gas fuels. Standard unit capacities —from 200 to 830 boiler horsepower (7,200 to 30,000 lbs. of steam per hour). Larger units for special needs.

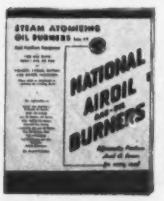
BULLETIN No. 25. DUAL STAGE OIL BURNERS

4 pgs. Data points out advantages when *both* mechanical and steam atomizing principles are incorporated in a single oil burner. 3 standard sizes are shown.



BULLETIN No. 51A. UNIVERSAL REGISTER UNITS

4 pgs. Data offered on full line of these quality National Airoil products with capacities ranging from 60 to 500 gph.



BULLETIN No. 21. STEAM ATOMIZING OIL BURNERS

16 pgs. Describes "SA" Burner for use where steam or compressed air is available for firing many types of industrial process furnaces. 5 sizes have rated capacities from 10 gph to 725 gph.

Second in a series of check lists on Annin features

CHECKUP on your Control Valves... CHECKOFF these Annin Advantages*

***Providing the optimum in design and performance features**

MINIMUM PARTS and simplicity of construction in Pneumatic Position Unit.

THREE POINT guiding and self lubricating seals in pneumatic piston actuators.

ADJUSTABLE TOP LOADING of piston permitting optimum control performance over maximum range of conditions on pneumatic positioning actuator.

BODY ORIENTATION as specified on any three-way valve at no extra charge.

CORNER VALVE BODY construction ½" through 2" in all body ratings converted on job site.

WIDE SELECTIVE range of reduced port (Pee Wee construction) trim available with CV ranges 2.5, 1.5, 1.0, 0.60, 0.25, 0.10, .063, .040, .025, .016, .010, at no extra charge.

REDUCED PORTS stepped down three or more sizes interchangeable in all models.

MINIMUM CV available of .000001.

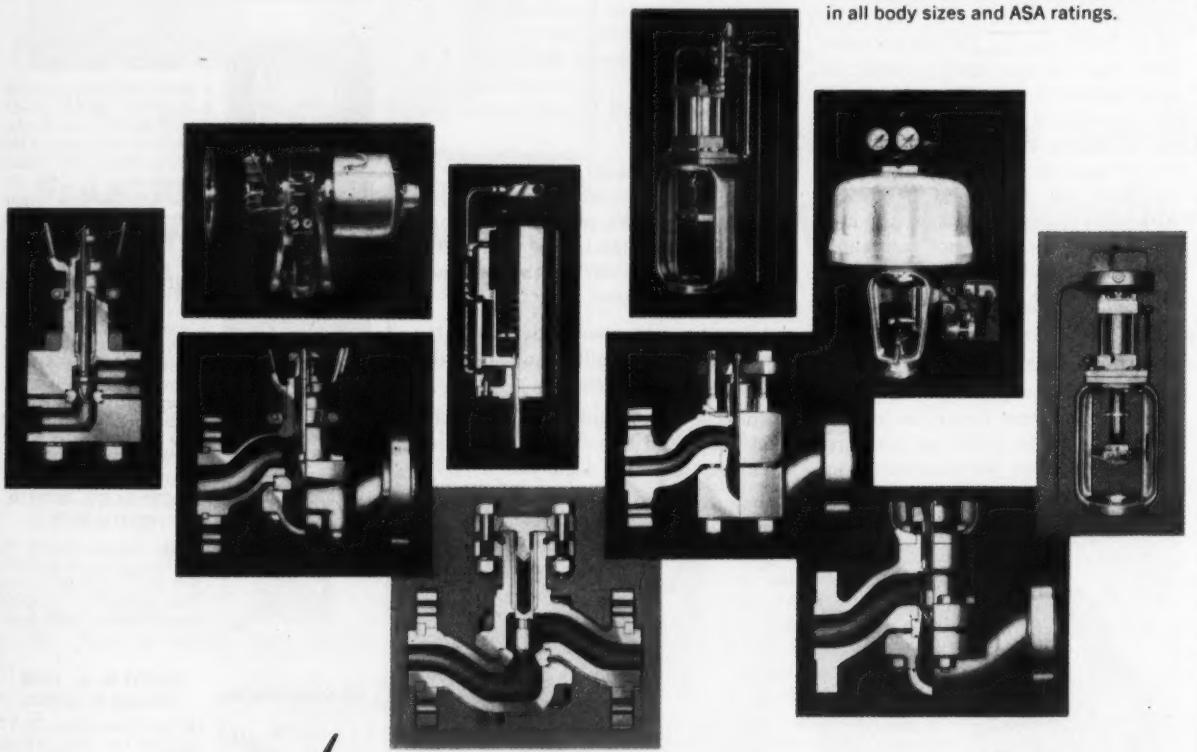
NO EXTRA CHARGE for reduced ports in any model 1 inch and under.

SOFT SEAT construction for guaranteed bubble tight shut off available in all models at minimum cost.

WIDE CHOICE of special body gasketing for all applications within temperature-pressure limitations of any valve.

TEFLON CHEVRON packing standard on all valves. Other types on request.

SPLIT BODY CHECK VALVE available in all body sizes and ASA ratings.



Annin VALVES

THE ANNIN COMPANY
1040 South Vail Avenue
Montebello, California

Check 3426 opposite last page.

15 sec—a rate double that of portable crane hoist previously employed. At this speed, drums are handled smoothly to minimize ink splashing. Records show an around-the-clock average of 28 drums/hr are handled.

(Air-operated and foot-operated portable elevating trucks are product of The American Pulley Company, 4200 Wissahicken Ave., Philadelphia 29, Pa.)

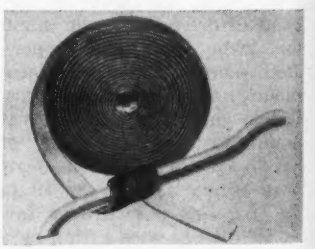
Check 3427 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Space limitations flouted by wrap-on, asbestos pipe insulation

Uses: Insulation of pipe.

Features: Insulation can be worked with under difficult application conditions of close-clearance and on bent or curved instrument lines and pipe. It can be removed and



Wrap-on asbestos insulation has exposed surfaces and edges of asbestos jacket coated with Neoprene

reapplied without loss of insulating efficiency.

Description: Wrap-on asbestos insulation consists of long-fibered asbestos rovings. These are completely enclosed in tubular, woven-asbestos jacket. Exposed surfaces and edges of jacket are heavily coated with Neoprene. Covering is thus essentially noncombustible and resists penetration of moisture, **oil** and

grease. Wire bands or clamps are used at intervals to hold insulation firmly in place.

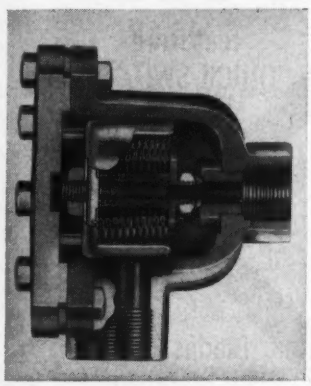
(Insutape insulation is product of Fibrous Products Division, Union Asbestos & Rubber Co., 1111 W. Perry St., Bloomington, Ill.)

Check 3428 opposite last page.

Bellows-fractures fears reported foundless in steam trap

Modulation of steam trap is with flow degree

Uses: Condensate trapping.
Features: Steam trap modulates with degree of flow. Consequently, is not subjected to possible bellows fracture.



Thermostatic steam trap modulates with degree of flow

Description: Thermostatic-steam-trap design permits use of proportionately greater orifice for high capacity—460" on ½" size will handle 17,500-lb condensate/hr at 125 psig.

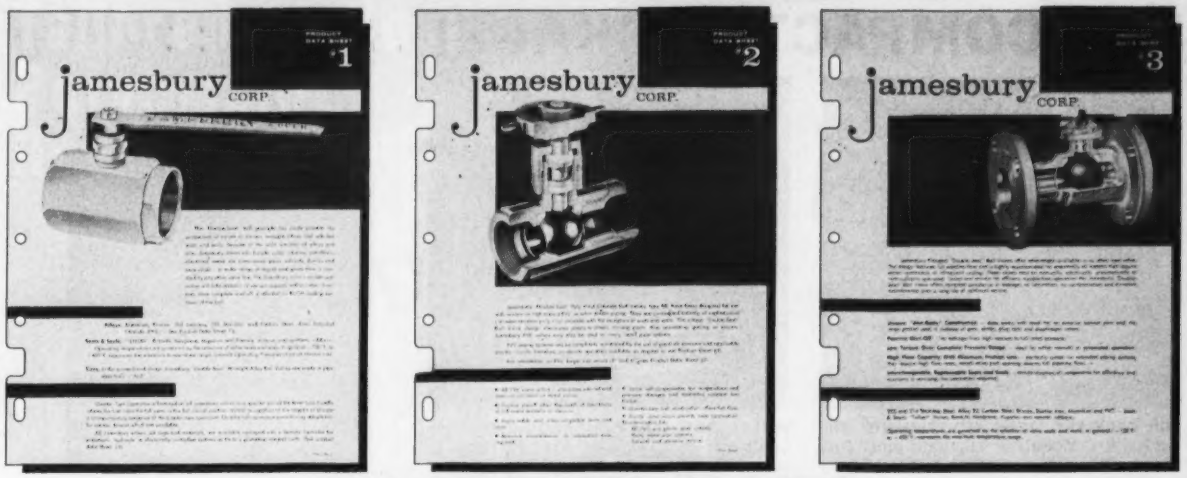
(Steam trap TM is product of The C. E. Squires Co., 18502 Syracuse Ave., Cleveland 10, Ohio.)

Check 3429 opposite last page.

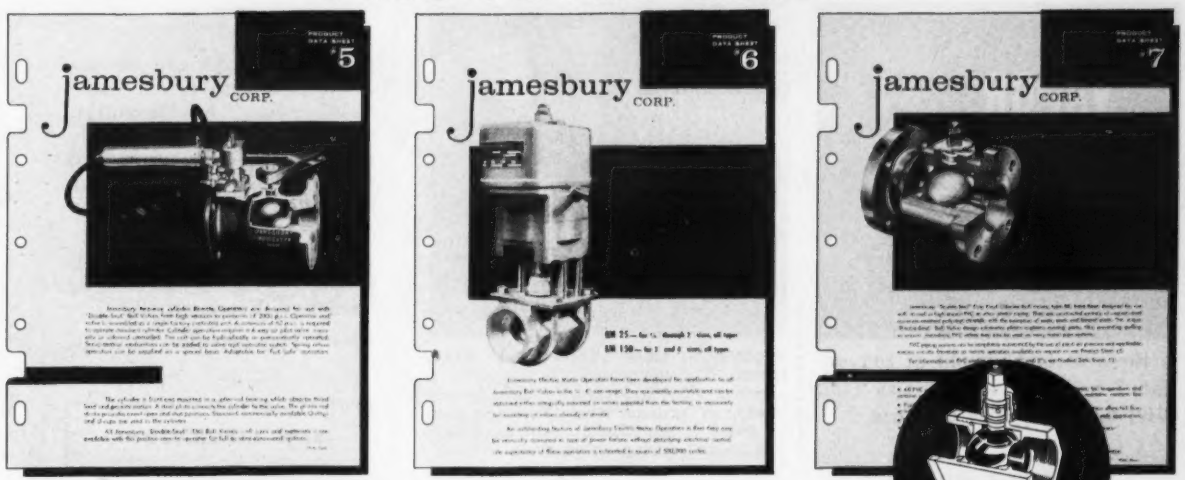
Sledge-blow need muted in locking vibrators to hopper cars

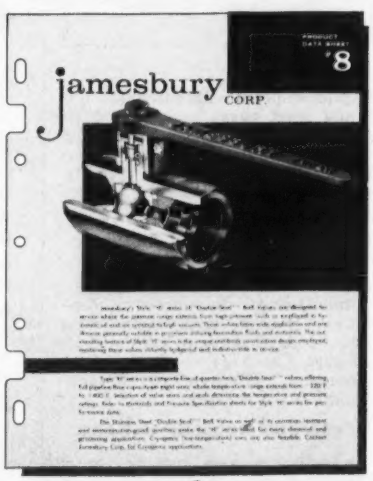
Uses: Mounting rotating vibrators on hopper-car chutes.
Features: Mount engages securely in female on hopper-car chutes without need for

Yours For The Asking!



FACTUAL DATA





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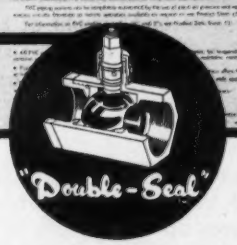
JAMESBURY BALL VALVES
HELPING BUILD OUR NUCLEAR NAVY



on jamesbury
BALL VALVES
AS VERSATILE AS INDUSTRY ITSELF

Get the full story on Jamesbury Corp.'s complete line of "Double-Seal" Ball Valves and accessories. Learn why the Jamesbury "Double-Seal" Ball Valve has been labeled "as versatile as industry itself". Get all the facts on materials, sizes, etc. They are yours for the asking: the facts about Jamesbury Corp. – the nation's foremost exclusive manufacturer of Ball Valves.

JAMESBURY CORP.
NEW STREET, DEPT. PDS, WORCESTER, MASS.
Please send me the Data Sheets checked below.

#1 #2 #3 #5 #6 #7 #8

Name..... Title.....

Company.....

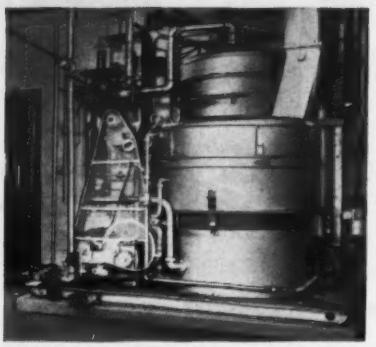
Address..... City..... State.....

JAMESBURY CORP., 64 NEW STREET, WORCESTER, MASS.
Distributors in Principal Cities

Check 3430 opposite last page.

3 BOILERS IN 1 COMPACT PACKAGE!

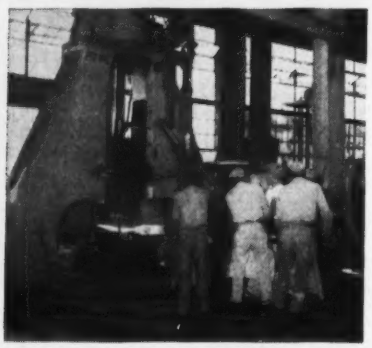
FOR ORDINARY STEAM REQUIREMENTS: The cycle-type Modulātic standard unit furnishes 90% dry steam for most ordinary needs such as cooking, heating water, drying, cleaning, etc.



WHERE DRY STEAM IS REQUIRED: The Modulātic may be used with an optional steam separator, for over 99% dry steam for heating, moulding, forges, operation of power equipment, etc.

VAPOR MODULĀTIC WATER TUBE BOILERS

¼ the size and weight of conventional boilers... largest size (150 BHP) uses only 5′ x 8′ space.



IF CONSTANT STEAM LOAD MUST BE MAINTAINED: For applications where even a nominal drop in pressure cannot be allowed, an optional steam reservoir may be added to the standard unit to provide a "cushion" during an off cycle.

Efficient . . . economical . . . proved in thousands of installations all over the world! Vapor Modulatics furnish high or low-pressure steam (at design pressures up to 1000 psi, or even higher). Lowest installation costs—delivered completely assembled, wired and tested . . . all sizes (40 to 150 BHP) fit through plant doors, with no special foundations or special chimneys needed. Simple push-button operation; built-in safety controls. May be mounted in multiple units to provide for the largest steam requirements—without the inefficiency of idling larger single boilers as demand slackens.

send for free literature:

VAPOR HEATING CORPORATION, DEPT. 3-G
80 E. Jackson Blvd., Chicago 4, Ill.

Please rush me your free bulletins on Modulātic Water Tube Boilers.

NAME_____
TITLE_____
FIRM_____
ADDRESS_____
CITY, ZONE, STATE_____

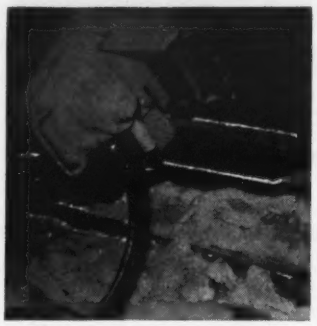
Our requirements are:

BHP REQUIRED_____
SAFETY VALVE SETTING_____
MINIMUM STEAM LOAD_____
MAX. STEAM LOAD_____
STEAM PRESSURE_____
TYPE OF FUEL_____

Check 3431 opposite last page.

blows from heavy sledge.

Description: Positive lock-in wedge mounting gives good vibration transmission. Re-



Mount holds car-shaker vibrator on hopper. Wedge is in locked position

moval of mount can be accomplished with two-lb hammers, swung horizontally, driving key back into appropriate slot. Here compound wedge action causes positive separation of locked male and female mount.

(Locking wedge mount is product of Martin Engineering Company, Neponset, Ill.)

Check 3432 opposite last page.

NEW LITERATURE

Plant Engineering Maintenance & Safety

Explosion-proof illuminators for liquid level gages are covered in two-page data sheet. Units are easy to install and provide three times the illumination formerly available. Data Sheet 375 — Jerguson Gage & Valve Co.

Check 3433 opposite last page.

Viton O-rings' characteristics, limitations, resistance, geometry, uses and standard sizes are tabulated in 22-page Cat 5711 — Parker Seal Company, Division of Parker-Hannifin Corporation.

Check 3434 opposite last page.

Insulating line, including spun-mineral-wool, calcium-silicate and 85% magnesia products in block, blanket, felt, fill, cement and pipe forms are reviewed in 24-page 1960 Cat — Baldwin-Ehret-Hill, Inc.

Check 3435 opposite last page.

NOW competitively priced! NEW Aeromaster INDUSTRIAL COOLING FAN

featuring "QUICK-SWITCH" BLADES

Blades can be installed after hub is mounted on drive shaft

Performance, construction, and price make this the "best buy" in industrial fans! Delivers more CFM with *less* H.P. Features a ductile iron hub, removable blade retention caps, heat treated aluminum alloy blades with constant chord width and flanged ends. 4, 6 and 8 bladed fans available in 54″ to 120″ diameters. Maximum tip speed is 15,000 ft./min. Easy to install . . . easy to maintain. For complete details, write: KOPPERS COMPANY, INC., 5207 Scott Street, Baltimore 3, Md.

KOPPERS Aeromaster Fans

Engineered Products Sold with *Service*

Check 3436 opposite last page.

DC power supplies are inventoried in 16-page catalog listing transistorized, magnetic amplifier-regulated, missile test and launching, and magnetic amplifier-transistor regulated power supplies, among others. Cat E60 — Perkin Engineering Corporation.

Check 3437 opposite last page.

Solid-film lubrication and protective coating process, which has been developed for extreme lubrication needs is discussed in four-page brochure. The lubricative pigment used, called Almasol, has high load-carrying strength, a low coefficient of friction, chemical inertness, a natural affinity for metals and the ability to retain these characteristics up to 1900°F. "Almasizing" — The Almasol Corporation.

Check 3438 opposite last page.

Horizontal centrifugal pumps of double-suction single-stage type are explained in 18-page bulletin which incorporates performance charts for various types in line. Bul B-1300. — Peerless Pump Division, Food Machinery and Chemical Corporation.

Check 3439 opposite last page.

Roller bearings are expanded upon in 12-page bulletin which incorporates tables including dimensions and rated radial-load capacities (in lb at various rpm) for different types of bearings in line. Bul 114—Hoover Ball and Bearing Company.

Check 3440 opposite last page.

Electrical cable which is insulated with highly compressed refractory mineral and enclosed in liquid-tight and gas-tight metallic-tube sheath is reviewed in 16-page MI Cable Cat — General Cable Corporation.

Check 3441 opposite last page.

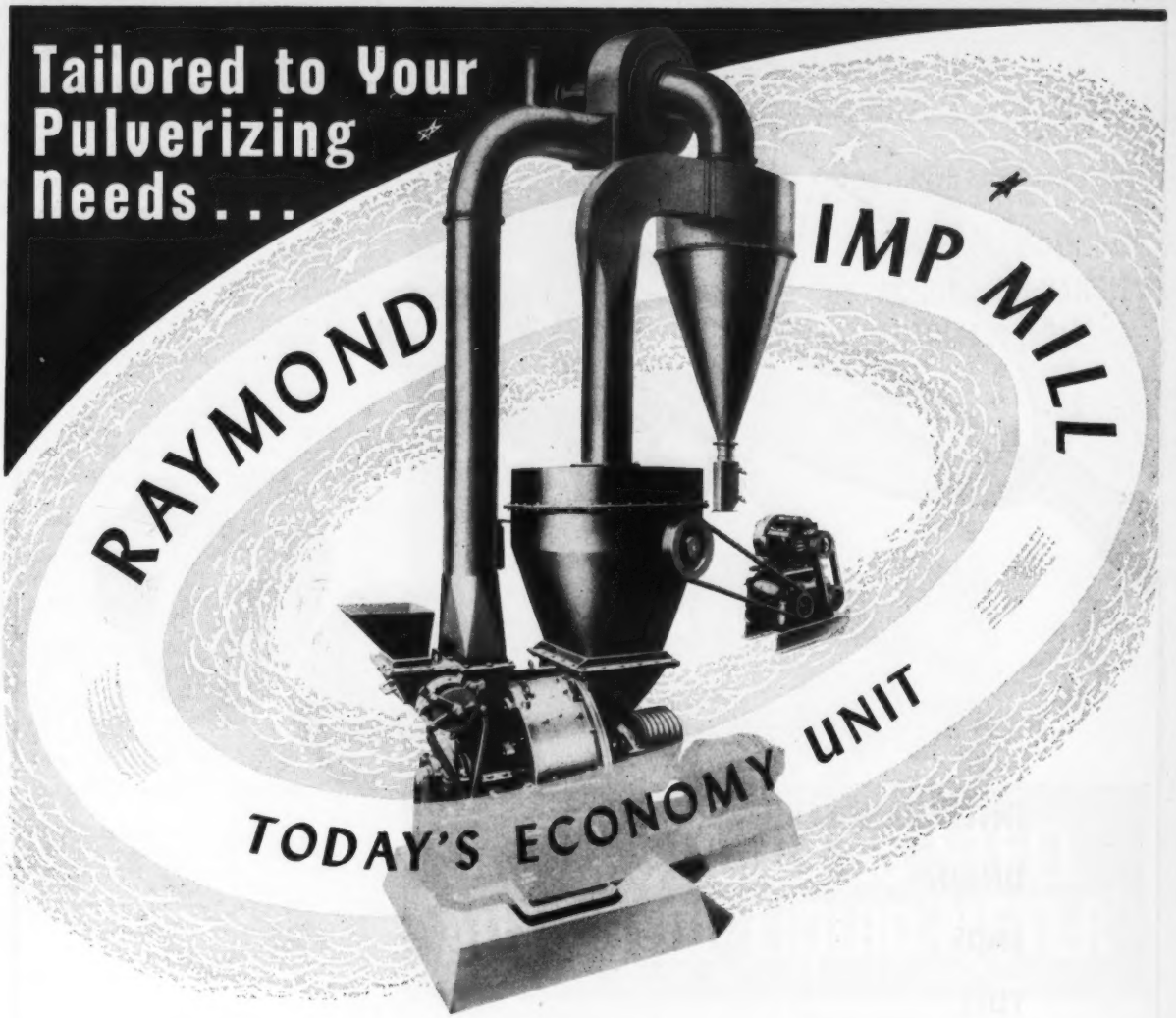
Specifying laminated plastics and vulcanized fibers is topic of eight-page reprinted magazine article. Article describes most common faults encountered and summarizes basic properties of family of materials. Laminated Plastics Reprint — Taylor Fibre Co.

Check 3442 opposite last page.

NEXT MONTH

Ball valves are popping up everywhere these days. They are in fact causing a revolution in the valve habits of the CPI. The dramatic success story of the ball valve is the subject of a special report in these pages next month.

Tailored to Your Pulverizing Needs . . .



Write for Catalog No. 87
"Mill of a Thousand Uses"

THIS compact grinding unit is one of the most versatile and economical mills in the Raymond line for medium size plants.

It occupies small floor area . . . fits readily into any plant layout . . . delivers up to several tons per hour . . . handles a great variety of non-metallic minerals, chemicals and specialty products.

It is equipped with the *whizzer air separator* which gives efficient fineness control . . . increases output of fine material, assures consistent uniformity of product . . . all with the utmost economy of operation and maintenance.

The Imp Mill may be furnished with *flash drying accessories* for removing moisture while pulverizing, such as in drying and grinding ball clays direct from the pits, or in calcining gypsum for making wallboard.

If you have an unusual product that is difficult to process . . . the Imp Mill may be the answer to your problem. It provides a clean, dust-free, automatic system that cuts costs.

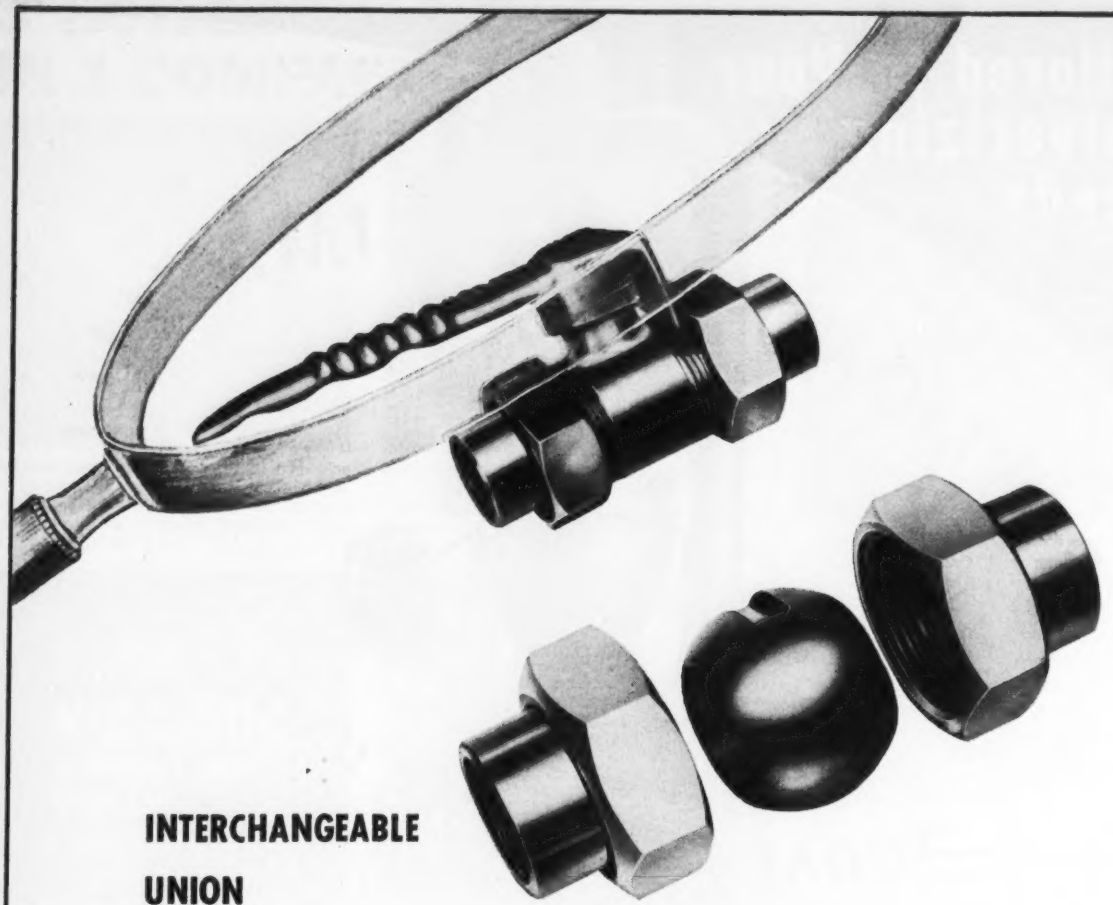
COMBUSTION ENGINEERING, INC.
Raymond Division

1116 W. BLACKHAWK ST.
CHICAGO 22, ILLINOIS

Combustion Engineering-Superheater Ltd., Montreal, Canada

SALES OFFICE IN PRINCIPAL CITIES

Check 3443 opposite last page.



INTERCHANGEABLE UNION ENDS FULL PORT OPENING BETTER BALL VALVE

Versatile Cooper Ball Valves throttle like globe valves; handle slurries like diaphragm valves; control flow with the positive on-off operation of gate valves. Full port openings — straight through flow pattern — no turbulence. Interchangeable union ends for maximum versatility in any of the wide variety of end connections available. Valves go "on stream" in minutes. No other ball valves give you these plus features which guarantee maintenance-free operation and *eliminate costly down time.* Write for Bulletin BVF.

COOPER ALLOY
Corporation • Hillside, New Jersey

Check 3444 opposite last page.

Chemical Boobytraps

Unsuspected hazards awaiting the unwary

High-pressure H_2 leakage proves disastrous

A serious explosion occurred last year in Ube City, Yamaguchi Prefecture, in the ammonia-synthesizing room of Japan's Ube plant of Kyowa Hakko (Fermentation) Company. It occurred in gas separator in insulation box of mixed-material gas-separating apparatus for ammonia synthesizing.

Mixture of heavy oil, oxygen and steam was burned in the heavy-oil vaporizer. While process of removing CO, CH_4, etc out of ammonia material gas formed (under low temperature by liquefaction) was going on normally, central portion of gas separator in insulation box exploded suddenly, accompanied by fire.

Animal hair in insulation box and insulation cork caught fire. This soon developed into a conflagration. Plant workers tried in vain to quench fire. City fire brigade, with help of local fire-fighting group, fought for two hours before another big explosion occurred.

This blast caused death of 11, serious injury to 14 and minor injury to 22 persons. Total property damage was estimated at roughly $694,000. Investigation indicated leak of hydrogen gas from some place in the separator caused first explosion, and remaining gas initiated second.

(Above account was contributed by Dr. Yoshio Sakai, Chief of High-Pressure Gas Unit, Light Industry Bureau, Ministry of International Trade and Industry, Chiyoda-Ku, Tokyo, Japan. Dr. Sakai is quite interested in exchanging technical information on high-pressure-injury prevention with persons in this country. Interested readers are urged to contact him at the above-mentioned Tokyo address. Or, leters can be addressed to him c/o Safety Editor, CHEMICAL PROCESSING.)

manufacturers' current literature

This section features a variety of literature currently available from manufacturers. See also the other sections in this issue for new literature pertaining to those particular sections

Material Handling

Bulk-storage system incorporates glassed-steel storage structures with mechanical sweep-arm bottom unloaders. These are treated in Bul MU-107—Harvestore Products Division, A. O. Smith Corporation.

Check 3445 opposite last page.

Tubular-conveyor industrial applications are outlined in detail and illustrated with diagrams and photographs in 52-page Applications Cat—Conveyor Division, Hapman Corporation.

Check 3446 opposite last page.

Fork-lift trucks, which are available in capacities of 3000 to 10,000 lb with cushion tires and 3000 to 8000 lb with pneumatic tires are outlined in Lift Trucks Bul — Automatic Transportation Company, Division of The Yale & Towne Manufacturing Co.

Check 3447 opposite last page.

Tractor-shovel which has two speeds forward and reverse features power steering, power-transfer differential, 4500-lb breakout force, 2500-lb carry capacity and six-ft turning radius. Unit is detailed in H-25 Payloader Data—The Frank G. Hough Co., Subsidiary of International Harvester Company.

Check 3448 opposite last page.

Conveyors of various types and their accessories are pictured in 40-page bulletin, which also includes information on ball transfers, alligator switches and rollers utilized in conveyors. Cat 36—Logan Co.

Check 3449 opposite last page.

Separation and Size Reduction

Roller-mill case history, in which pepper was ground to −40 mesh at production rates from 2 to 3000 lb/hr without generation of excessive heat or causing of unnecessary loss of volatile oils, is subject of Pointers, Vol. 2, #5. Roller-mill specifications are included in Bul 153-A—Sprout-Waldron.

Check 3450 opposite last page.

Fluid-energy mills control fineness and product quality and, simultaneously with grinding, dehydrate, coat particles, blend and achieve chemical changes. They are reviewed in Jet-O-Mizer Mills Bul—Fluid Energy Processing & Equipment Company.

Check 3451 opposite last page.

Mulling is discussed in Mulling Bul—Simpson Mix-Muller Division, National Engineering Company.

Check 3452 opposite last page.

Ferrous traps for liquid-pipeline protection against fine- and tramp-iron contamination are effective with materials to 750°F and withstand pressures to 150 psi. They are further clarified in Ferrous Traps Bul—Eriez Mfg. Co.

Check 3453 opposite last page.

Pelleting machinery produces pellets without steam and binders from ⅛ to 1″ in diam and in lengths of 2″ or more. Units are considered in Bul L-109—Industrial Division, Daffin Manufacturing Company.

Check 3454 opposite last page.

Centrifugal impact mills and mixers are tabulated in Mills & Mixers Buls—Entoleter, Division of Safety Industries, Inc.

Check 3455 opposite last page.

Attrition mill with single revolving disc incorporates special hollow-shaft screw feeder. Unit is presented in Attrition Mill 245 Bul—The Bauer Bros. Co.

Check 3456 opposite last page.

Centrifugal air separators in range of 60 to 400 mesh are basis of Air-separation Formulas Bul—Rubert M. Gay Division, Universal Road Machinery Co.

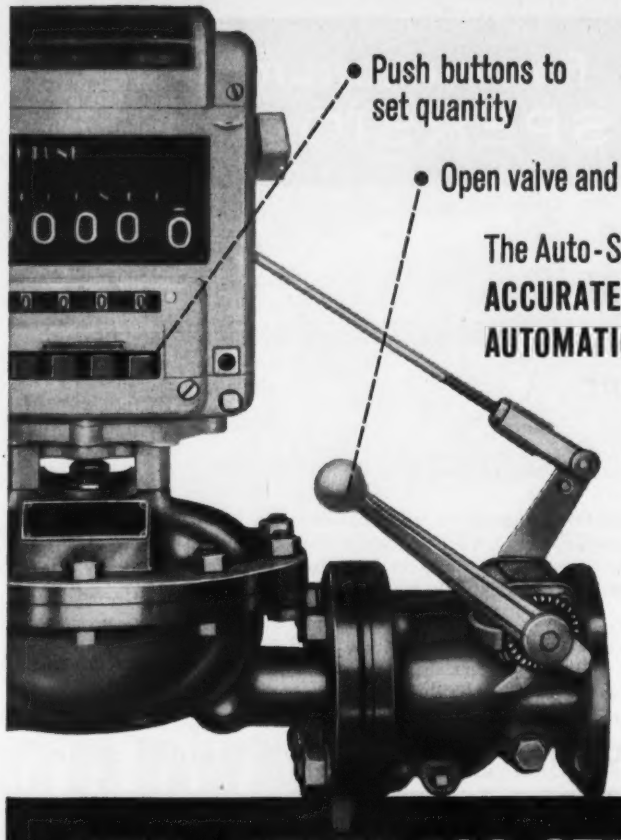
Check 3457 opposite last page.

Centrifugal separation under pressure is subject of bulletin which outlines performance characteristics of Super-D-Canter unit. Bul 1287—The Sharples Corporation.

Check 3458 opposite last page.

Air separators are available in nine models with diameters of 3 to 18′. They are delineated in Bul 087—Sturtevant Mill Company.

Check 3459 opposite last page.



NEW...STAINLESS STEEL AUTO-STOP LIQUID METER

It's here! *Automatic formula control* for the batching of corrosive liquids or liquids that must be kept free from contamination! It's the new Neptune Stainless Steel meter with all-stainless, Auto-Stop valve. The register watches the delivery, automatically trips the valve shut at the exact quantity. Valve is mechanically coupled...no inaccuracies due to time-lag in cut-off.

Saves time, ingredients, labor...puts end to spoiled batches...cleans up hazardous or messy conditions...provides accurate cost records. Accuracy is completely protected from effects of corrosion or corrosive wear. Only two moving parts in meter contact liquid. Gear train is outside the casing, isolated from liquid.

Size 1½″, capacity 20 to 100 gpm. Also available with repeating Auto-Stop that "remembers" formula, and with ticket printing and electrical Auto-Switch combinations.

NEPTUNE METER COMPANY
Liquid Meter Division
47-25 34th St., Long Island City 1, N. Y.

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Branches in: ATLANTA • BOSTON • CHICAGO • DALLAS
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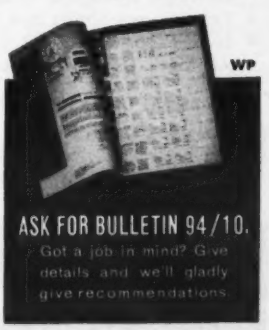
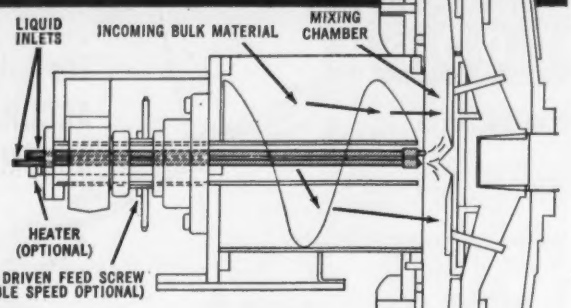


ASK FOR BULLETIN 94/10.
Got a job in mind? Give details and we'll gladly give recommendations.

Check 3460 opposite last page.

For maximum
DISPERSION

in dry and semi-dry operations



Multiple liquid additives (heated or unheated) now can be dispersed with new uniformity. This unit which does the job so efficiently is the Bauer No. 245 single revolving disc attrition mill equipped with a special hollow shaft K 1909 screw feeder.

TYPICAL USES

Blending chemicals, feeds, wood flour, molding powders, fertilizers, insecticides, and similar processes. Write for details.

THE BAUER BROS. CO. / SPRINGFIELD, OHIO

Check 3461 opposite last page.

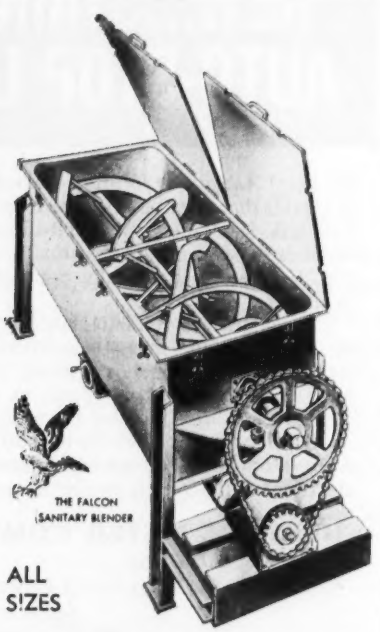
The FALCON
RIBBON BLENDER
"the TOP-FLIGHT Mixer"

- POWER
- PRODUCTION
- PRICE

FEATURES . . .

- *All Welded Construction*
- *Mild Steel or Stainless*
- *Approved Sanitary Design*
- *All Rounded Corners Thruout*
- *Quickly Demounted for Cleaning*
- *Extra Heavy Shafts and Ribbons*
- *Leak Proof-Dust Tight Outlet*
- *All Sizes Usually in Stock*

MANY REPEAT ORDERS FROM PLANTS NOW USING FALCON MIXERS



ALL SIZES

SEND FOR ILLUSTRATED BROCHURE

The FALCON MANUFACTURING DIV. of
The FIRST MACHINERY CORP.
209-289 TENTH ST., BKLYN. 15, N. Y. ST. 8-4672

Check 3462 opposite last page.

CURRENT LITERATURE

Vibrating screens are presented in Vibrating Screens Bul—Entoleter, Division of Safety Industries, Inc.

Check 3463 opposite last page.

Wet- and dry-grinding units are inventoried in Bul AH-448—Hardinge Company, Incorporated.

Check 3464 opposite last page.

Safety

Roof ventilators which require no weather covers are reviewed in Bul 680-CP—Propellair®, Division of Robbins & Myers, Inc.

Check 3465 opposite last page.

Bromine's role in fighting fires is one of topics considered in Bromine Bul—The Dow Chemical Company.

Check 3466 opposite last page.

Ventilator-exhausters, for exhausting welding fumes or foul air from enclosed vessels, are presented in Ventilator-exhausters Bul—Coppus Engineering Corp.

Check 3467 opposite last page.

Process Instrumentation

Liquid-level controls have no moving parts in liquid. They are inventoried in 32-page Liquid-level Controls Cat—Charles F. Warrick Co.

Check 3468 opposite last page.

Recording charts are available in more than 15,000 different types. They are subject of GC Stock List—Technical Sales Corporation, Subsidiary of Graphic Controls Corporation.

Check 3469 opposite last page.

Multi-conductor thermocouple extension cable is available in 6, 14, 18, 25, 39 or 56 pairs and comes in all standard thermocouple materials. It is inventoried in Thermo-Cable Bul—Thermo Electric Co.

Check 3470 opposite last page.

Bi-metal thermometers, which are accurate to within ±1% of range, are available with three- or five-inch heads. They are reviewed in 4000 Series Thermometer Bul—Weston Instruments Division, Daystrom, Incorporated.

Check 3471 opposite last page.

Proportioning pumps have repetitive metering accuracy of ±1% when operating between 10 and 100% of capacity. They are explained in Proportioning Pumps Bul—Pump Division, American Meter Company Incorporated.

Check 3472 opposite last page.

Liquid-level controllers utilize conventional 3- to 15-psi signal air pressure and have "zero" to 150% adjustable proportional bands. They are presented in Bul 456-1—Kieley & Mueller, Incorporated.

Check 3473 opposite last page.

Radiation pyrometers can be used in furnaces and kilns with temperatures of 1400 to 6000°F and in high-temperature liquid baths. Pyrometers are reviewed in Bul RAD—West Instrument Corp.

Check 3474 opposite last page.

Rotameter-transmitter incorporates no sludge-catching elbows or stagnant pockets. Unit is outlined in Design Spec Sheet DS-361—Brooks Rotameter Company.

Check 3475 opposite last page.

Internal-r e fl u x computer-control system is detailed in Bul 98374—Taylor Instrument Companies.

Check 3476 opposite last page.

Valves

Plug valves in sizes of ¼ to 8" are available for temperatures of −150 to +400°F and pressures from high vacuum to 615 psi. They are topic of Bul SC-60—Continental Manufacturing Company.

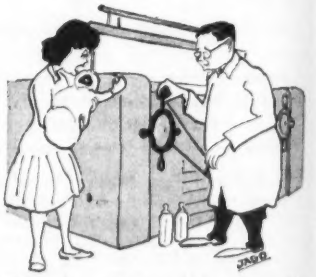
Check 3477 opposite last page.

Check valves (654) and cause, effect and control of water hammer (851) are taken up in Buls 654 and 851—The Williams Gauge Co., Inc.

Check 3478 opposite last page.

Globe and angle valves of screwed and flanged types are tabulated in four-page Bul L-475—The Bastian-Blessing Company.

Check 3479 opposite last page.



"Really Dear, his formula doesn't have to be a 6 grind."

(Idea by A. Podolsky Dunne & Reynolds Paint Co.)

Ball valves of double-seal design in various models are specified in Ball Valve Data Sheets—Jamesbury Corp.

Check 3480 opposite last page.

Ram-type drain valves, which are so designed that in closed position piston or ram extends up into tank to prevent outlet becoming plugged, are considered in Drain Valve Cat—Strahman Valves, Inc.

Check 3481 opposite last page.

Gate valves of all-jacketed type with replaceable seats are available in line sizes of 1-½ to 4″ in cast iron, steel, bronze, Ni-Resist and stainless steel. Valves in line sizes of 6 to 12″ are made of fabricated or stainless steel. Valves are listed in Cat J-50—Hetherington & Berner, Inc.

Check 3482 opposite last page.

Flanged-end and forged-steel gate, globe and check valves with hard-faced seats incorporate ASA standard flanges and face-to-face dimensions. Information on valves is incorporated in Gate, Globe, Check Valves Bul—Henry Vogt Machine Co.

Check 3483 opposite last page.

Ball valves of fixed-bearing type are considered in Flo•Ball Valve Bul—Hydromatics, Inc.

Check 3484 opposite last page.

Butterfly valves of resilient-seated type are explained in Bul 590X—W. S. Rockwell Company.

Check 3485 opposite last page.

Corrosion Control

Hot-spray vinyl protective coating, which builds-up film thicknesses of five mils or better in two passes of spray gun, and companion primer which locks coatings to damp or dry rusted steel are considered in Tygon Painting Manual—Plastics & Synthetics Division, U.S. Stoneware.

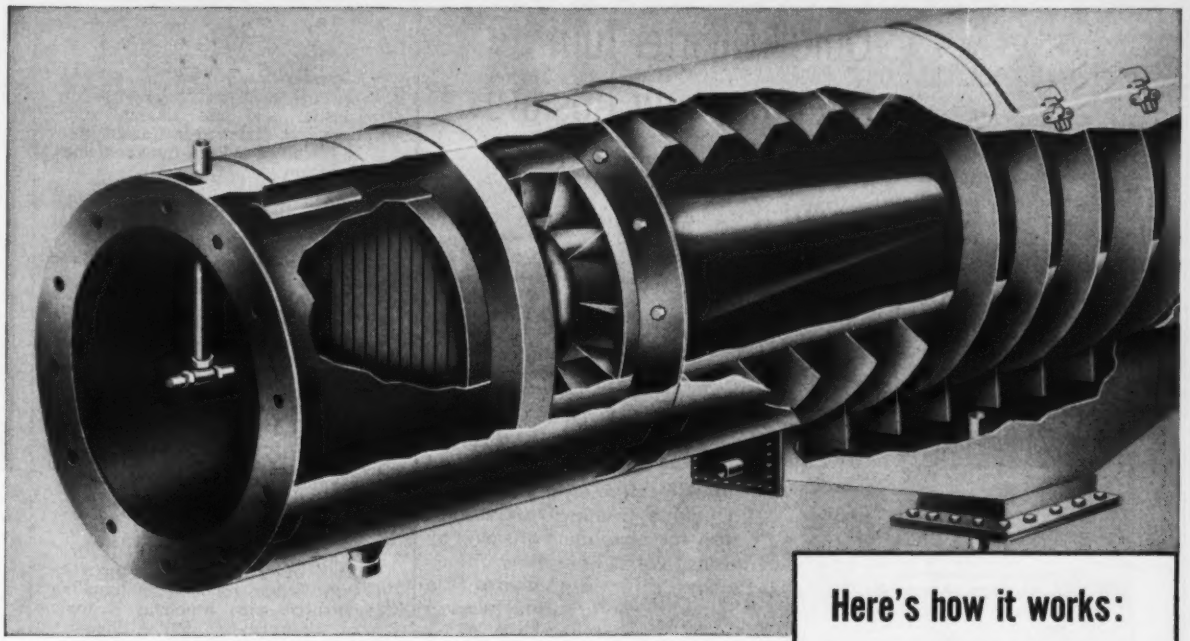
Check 3486 opposite last page.

Vacuum pans, in capacities of 30 to 500 gal, and quick-cooling pans, with capacities of 50 to 200 gal, are subjects of Vacuum and Quick-cooling Pans Buls—Lee Metal Products Company, Inc.

Check 3487 opposite last page.

Pipe and fittings of aluminum-bronze alloy for corrosion-resistant service available in all standard pipe sizes. Fittings are available for 3000 psi, flanges for 5000 psi. They are expanded upon in Pipe and Fittings Bul—Ampco Metal, Inc.

Check 3488 opposite last page.



The Western Precipitation

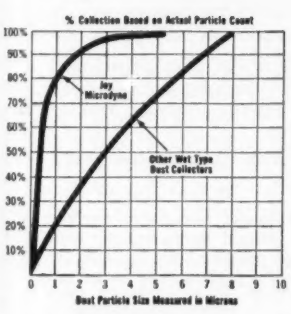
JOY MICRODYNE®

SCRUBBER PACKS HIGH EFFICIENCY IN 1/10 THE SPACE

Here's how it works:

a spray of liquid enters the collector along with the dust. An impingement screen helps to encase each particle with liquid. Then fixed vanes impart a whirling motion to the wet, dust laden air. Moisture and dust particles are thrown to the sides by centrifugal force and drain into a sump.

The liquid used may be water, oil or solvents, depending on the material being collected.



By combining two proved principles of dust collection, the Joy Microdyne collects over 99% by weight of dust particles 5 microns and larger; 92% of 2-micron dust. This means cleaner air.

Because of its unique design the Joy Microdyne is extremely compact . . . 1/10 to 1/20 the size of conventional wet collectors. For example: an 8000 cfm unit is only 26″ in diameter, 130″ long. This means lower initial cost and easier installation . . . in fact, the Joy Microdyne can be installed as part of existing ductwork.

The Joy Microdyne Scrubber is another in the wide range of dust collection equipment offered by Western Precipitation—by far the most complete line in the industry. *Write for descriptive literature!*

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DIVISION OF JOY MANUFACTURING COMPANY
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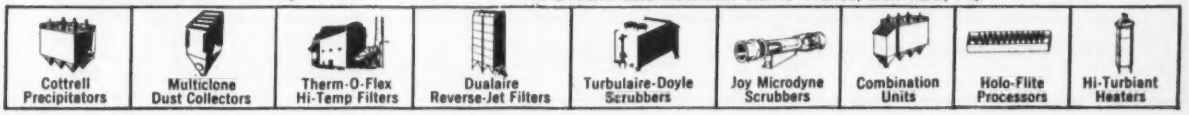
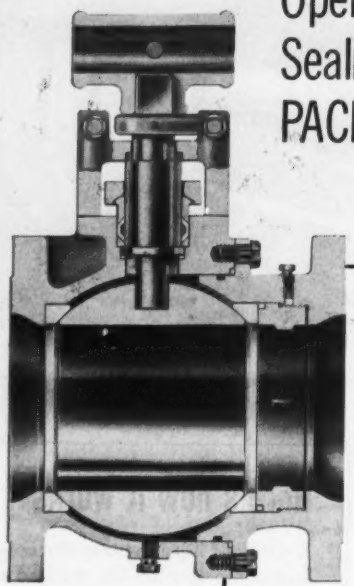


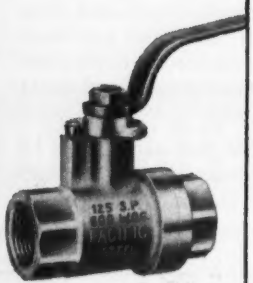
Check 3489 opposite last page.

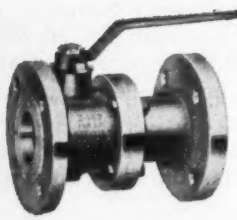
Quick Quarter-Turn Operation and Positive Sealing Featured in PACIFIC's **New** BALL VALVES



Pacific's new Ball Valves utilize elastomer seals and a unique floating ball design for absolute tight closures with line flow in either direction. Straight through, round parts promote efficient handling of slurries, semi-solid fluids and abrasive loaded fluids or gases. Hard, mirror finish of ball improves corrosion resistance and affords a low coefficient of friction. Quick, quarter-turn operation assures responsive, immediate full open or full closed positioning. Versatile valve handle can be installed in two positions for convenient operation even in the most confined quarters. Lightweight, compact design reduces installation cost and valves can be easily installed in any position.

Pacific offers a wide range of standard materials to custom-tailor these valves to fit your particular application without delivery delay or extra expenses. Available in sizes ¼" to 10" Pacific can meet your immediate needs with valves of Ductile Iron, Cast Iron, Bronze, Aluminum or Alloy Steels.





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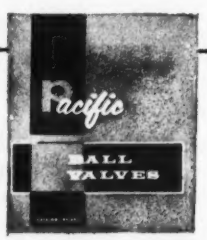


PACIFIC VALVES, INC.

3201 WALNUT AVE. LONG BEACH, CALIF.

Sales Offices in Most Principal Cities with Complete Valve Reconditioning Facilities in Houston, Texas; Woodbury, New Jersey; and Chicago, Illinois.

Check 3490 opposite last page.

CURRENT LITERATURE

Causul-metal valves, which provide corrosion resistance for many caustic, acid and alkaline solutions, are reviewed in Causul Metal Valves Bul—Lunkenheimer Company.

Check 3491 opposite last page.

Teflon tube, spaghetti and rod are tabulated in 10-page Teflon Products Bul—Timely Technical Products, Inc.

Check 3492 opposite last page.

Stainless-steel tube is fully annealed. Tube is detailed in Bul TB-365 — Tubular Products Division, The Babcock & Wilcox Company.

Check 3493 opposite last page.

Role of Fluoroflex®-T (proprietary Teflon product) in handling corrosive pipe problems is topic of Fluoroflex®-T Bul — Resistoflex Corporation.

Check 3494 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

PVC pipe and fittings of rigid normal- and high-impact types in Schedules 40 and 80 are specified in 12-page Form S-1032—Mueller Brass Co.

Check 3495 opposite last page.

Mechanical seals of Teflon for corrosion resistance are available in standard sizes to fit pump shafts of ⅞ to 2⅛". Seals are considered in Cat AD-164—Garlock Packing Company.

Check 3496 opposite last page.

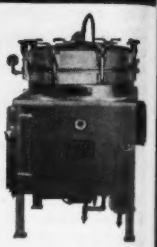
Glassed pump has every surface which comes in contact with pumpage protected by borosilicate glass, fused permanently to metal. Bond resists most acids at temperatures to 350°F and alkalies at moderate temperatures. Goulds-Pfaudler glassed pump is reviewed in Bul 725.2—Goulds Pumps Inc.

Check 3497 opposite last page.

Expanded-Teflon tube shrinks to form tight fit. It is used to encase irregular shapes, join chemical tube and metal fittings and in similar applications. It is explained in Expanded-Teflon Tube Bul—Pennsylvania Fluorocarbon Co., Inc.

Check 3498 opposite last page.

YOU GET *Lower* VACUUM PUMP MAINTENANCE *Costs* and Increased Vacuum with the **HILCO OIL RECLAIMER**



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For complete oil reclaiming. Removes solids, acids and volatile impurities; moisture, solvents, gases, etc. by heat-vacuum process.

A simple, economical and efficient method of restoring contaminated lubricating and sealing oil to the full value of NEW OIL. The HILCO will produce and maintain oil free of solids, water, gums and acids in a continuous, all-electric, automatic operation.

Be Sure of CLEAN OIL in your HIGH VACUUM PUMPS

KEEP YOUR HYDRAULIC SYSTEM *Clean* with **HILCO HYDRAULIC OIL FILTER**

No More Varnish and Sludge Deposits
No More Flushing and Manual Cleaning
No More Frequent Oil Changes
No More Accumulation of Dirt
Filter life up to a year eliminates usual frequent draining, refilling of systems.

Write for complete details in the free bulletin at no obligation . . .

THE HILLIARD Corporation

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In Canada
UPTON-BRADEN-JAMES LTD.

Check 3499 opposite last page.

THAT'S INTERESTING

'Skinning' germs

Skins of germs, sugar molecules linked chemically, are beginning to divulge some secrets which may aid scientists in developing new ways of fighting disease. Called polysaccharides, the type and organization of these skins determines the amount of antibodies formed to fight a germ, scientists have found.

Faraday revalued

Improved value for faraday has been obtained by National Bureau of Standards, using different experimental process. Process utilizes electrochemical method which dissolves, rather than deposits, silver in an electrolytic solution. Value obtained is 96,516.4 ± 2.0 coulombs (physical scale).

For more information on product at right, specify 3500 see information request blank opposite last page.

CARBORUNDUM'S TECHNICAL INFORMATION ON ELECTRIC HEATING

Data sheet

HEATING WITH SILICON CARBIDE ELEMENTS

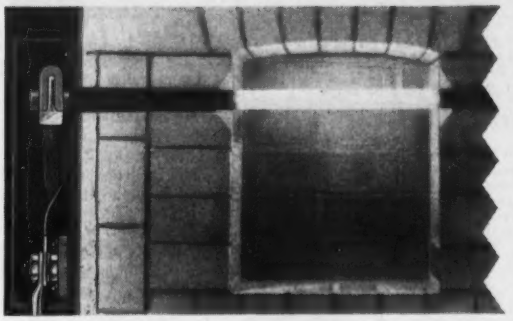
With electric heat, temperatures can be precisely maintained, cycles can be exactly duplicated, and furnace temperature can be accurately controlled. Product quality is improved, rejects sharply reduced. Electric furnaces and kilns are compact, clean, quiet and thoroughly dependable. There's also no fire or explosion hazard.

For these reasons, investigation of an electric heating application should include more than a comparison of Btu or electricity costs. The advantages and savings of electric heat frequently more than offset fuel cost differential. And this is particularly true in the case of furnaces heated with SiC elements.

Heating with GLOBAR® silicon carbide elements offers designers, builders, and operators of process equipment distinct advantages:

- Rod type elements simplify furnace design and construction.
- Long and trouble-free service. Maintenance is reduced and servicing simplified.
- Exceptionally high efficiency, low heat loss, clean radiant heat. No exhaust gases or combustion fumes. Cooler and safer working conditions.
- Elements easily and quickly installed from outside the furnace, there's no need to cool or unload the chamber. Production and operating losses are minimized.
- Temperatures up to 2800° F. Accurate heating independent of atmosphere.
- Elements can be operated continuously or intermittently in oxidizing or protective atmospheres within certain limitations.
- Transformers unnecessary for some applications. With these "on-the-line" installations, even lower initial cost.
- Elements available from stock or within 2 weeks if manufacture is necessary. Sizes range from ¼"-2⅛" in diameter, and from 4"-105" in length. Resistance tolerance only ±10%. Elements matched to meet your requirements.

Carborundum's accumulated experience and data may help solve your process heating problems. We invite your inquiries or contact electric furnace builders.



An element is a round rod with a heating section and a low resistance terminal at each end. The heating section is silicon carbide recrystallized for strength and rigidity at high temperatures, and contains no bonding material. The extremities of the terminals are metallized with aluminum to provide low resistance contact with the flexible straps. Elements can be mounted horizontally or vertically.

Ease of replacement is important feature of GLOBAR® elements. Operators simply shove in new ones without cooling down the kiln or furnace.

Typical applications of GLOBAR® silicon carbide heating elements

Annealing, sintering, brazing and heat treating of metals
Firing ceramics
Calcining powders and magnetic materials
Silver soldering and the firing of silver on ceramic parts
Roasting fluorescent oxides
Forging high strength, precision pieces
Firing of porcelain enamel
Reduction of oxides
Sublimating molybdic oxide
Production of Magnesium
Melting and annealing glass

Write today for your free copy of our technical Bulletin H describing physical and electrical characteristics of GLOBAR *elements. The address: Dept. CP-70, Globar Plant, Refractories Division, Niagara Falls, New York.*

For latest advances in silicon carbide heating elements . . . count on **CARBORUNDUM®**

Allflex

STAINLESS STEEL "MNH" FLEXIBLE CONNECTORS

These Stock Sizes
¼" ⅜" ½" ¾"
1" 1¼" 1½" 2"

In These Stock Lengths
12" 18" 24" 30"
36" 48" 60"

SHIPPED FROM FACTORY SAME DAY ORDER IS RECEIVED.

Also available in all standard sizes thru 16", in any required lengths, and with any special or standard end fitting or flange connections.

A NEW stock answer to pipeline problems caused by rigid connections.

- Dampens Vibration
- Compensates for Misalignment
- Permits Offset Movement
- Absorbs Expansion

With ALLFLEX Stainless Steel Connectors you get:

- **Corrosion Resistance. . .plus**
- **Pressure Resistance . . . plus**
- **Heat Resistance . . . plus**
- **Flexibility**

ALLFLEX Standard Stainless Steel Connectors are sold through leading Industrial Distributors. If not available locally — remember THEY CAN BE SHIPPED FROM FACTORY SAME DAY ORDER IS RECEIVED.

Also available in Monel, Bronze and Steel

Write TODAY for fact-filled Allflex Bulletin. Send your special flexation problems to Allied's Engineering Department for prompt, expert assistance.

Allied Metal Hose Company
3784 Ninth St., Long Island City 1, N. Y.
YES! Rush ENGINEERING DATA-SHEETS ON

☐ "MNH" Flexible Connectors
☐ I am particularly interested in Allied Flexible Metal Hose for

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Company .....
Address .....
City CP7-60

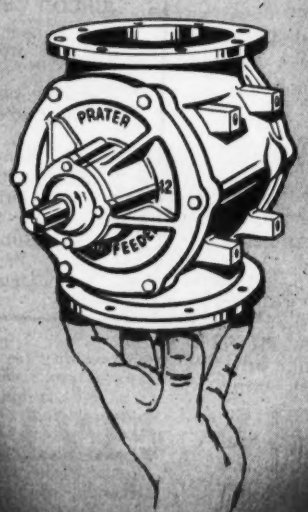
ALLIED METAL HOSE COMPANY
3784 Ninth St.
Long Island City 1, N. Y.
'phone STillwell 4-5173

Check 3501 opposite last page.

PRATER — *the recognized leader*

ROTARY AIRLOCK FEEDERS

for DUST CONTROL and PNEUMATIC CONVEYING



WRITE FOR BULLETIN P58

PRATER PULVERIZER COMPANY
1513 South 55th Court • Chicago 50, Illinois

Check 3502 opposite last page.

CURRENT LITERATURE

Kettle line includes 2/3-jacketed, 80- to 300-gal (CW); 2/3-jacketed, 5- to 500-gal (A); 2/3-jacketed, 5- to 100-gal (C); center-line scraper-agitator, 80- to 300-gal (CW3T); full-jacketed, 10- to 300-gal (B); and 2/3-jacketed, 40- to 200-gal (Pressure) models. These are pictured in A, B, C, CW, CW3T and Pressure Kettle Buls —Lee Metal Products Company, Inc.

Check 3503 opposite last page.

Heat exchangers incorporate stacked impervious-graphite blocks. They are detailed in Engineering Manual—The Carbone Corporation.

Check 3504 opposite last page.

Reinforced plastics' advantages in construction of various types of processing equipment is presented in 12-page pamphlet, "Indust"—Indust, Division of Industrial Sheet Metal Works.

Check 3505 opposite last page.

Teflon-filled packing and piston rings are presented in six-page Bul 575—C. Lee Cook Company, Division of Dover Corporation.

Check 3506 opposite last page.

Corrosion-resistant mortar for floors, processing vessels and other masonry installations is explained in Resin Cement 40 Bul—Sauereisen Cements Co.

Check 3507 opposite last page.

Lined drums in which lining thicknesses are controlled to within ±0.1 mil are cured in three-stage high-temperature oven. They are explained in Lined Drums Bul —Rheem Centrifugal Spray.

Check 3508 opposite last page.

Corrosion test cabinets, in which relative humidities of 95 to 100% from ambient temperatures to 125° are standard, are explained in Test Cabinet 411 Bul—Industrial Filter & Pump Mfg. Co.

Check 3509 opposite last page.

Pulp and storage tanks, in 500- to 2000-gal and 1000- to 5000-gal capacities respectively, are tabulated in Pulp and Storage Tanks Buls—Lee Metal Products Company, Inc.

Check 3510 opposite last page.

Teflon-jacketed gaskets, for use in glass-lined process equipment, light-metal flanges and glass-pipe flanges and fittings, are subject of Cat AD-154—Garlock Packing Company.

Check 3511 opposite last page.

Rubber-lined steel pipe and cast-iron pumps, plastic fittings, moldings, special fittings and pump parts of plastics or hard rubber are all incorporated in Rubber Linings Bul—American Hard Rubber Company, Division of Amerace Corporation.

Check 3512 opposite last page.

Stainless-steel fittings for light-wall Schedule 5 or 10 pipe are considered in Speedline® Fittings Cat—Horace T. Potts Company.

Check 3513 opposite last page.

Pipe and tube of expoxy-resin-reinforced construction is detailed in Tube and Pipe Bul—Fibercast® Company, Division of Youngstown Sheet and Tube Company.

Check 3514 opposite last page.

Expansion joints of solid Teflon and Teflon-lined type are topic of discussion of Cat AD-137—Garlock Packing Company.

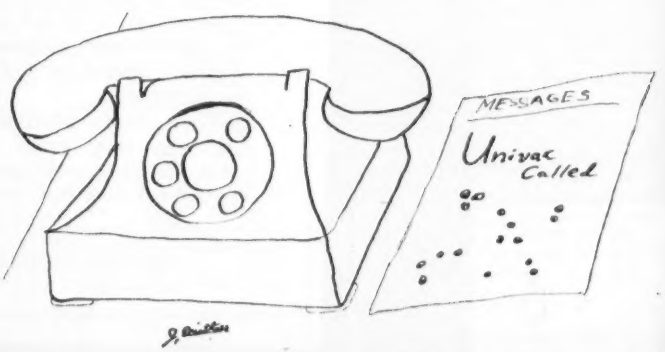
Check 3515 opposite last page.

Protective coatings, which guard metals against hot acids, acidic and sulfurous fumes, salt spray, steam and mild alkalies to 600°F, are specified in Cat MPC—Markal Company.

Check 3516 opposite last page.

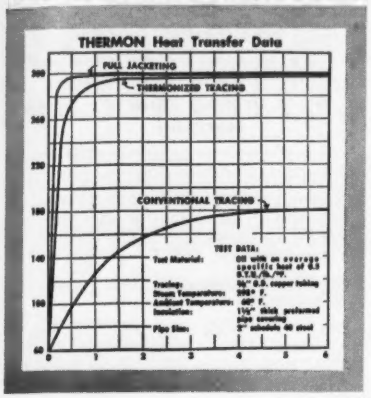
Teflon is subject of Buls T-110 and T-122—Crane Packing Company.

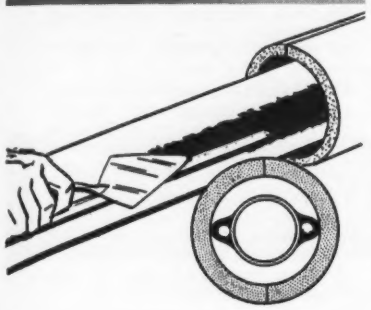
Check 3517 opposite last page.



THERMON

the proved solution to HEAT TRANSFER problems





Wherever heat transfer is a problem, non-metallic, adhesive Thermon Heat Transfer Cement, with its highly efficient heat transfer properties, usually can effect a solution. Approximately 5,000 different users, with hundreds of applications, have realized savings of up to 90% with Thermon.

Thermon can easily be applied over both steam tracing and electrical resistance systems, and is equally effective for heating and cooling operations.

Thermon's heat transfer characteristics are approximately *11 times* superior to those of steam tracing, and almost equal those of steam jacketing. Almost without exception, Thermon can be used in place of expensive steam jacketing—and can often be applied where steam jacketing is impossible. Up to 90% of the cost of steam jacketed equipment has been saved through use of Thermon.

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August 14th-17th

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MANUFACTURING CO.

1817 Rosine • P. O. Box 1961
Houston, Texas

Check 3518 opposite last page.

CURRENT LITERATURE

Kel-F halo fluorocarbon polymers are specified in Kel-F Bul—Chemical Division, Minnesota Mining and Manufacturing Company.

Check 3519 opposite last page.

Teflon sheets, rods, tube, tape and complete machine parts are subject of Teflon Bul—Plastic Products Division, Raybestos-Manhattan, Inc.

Check 3520 opposite last page.

Teflon packings of Lattice-Braid® type are good for temperature range of −120 to +500°F. Further information is outlined in Cat AD-131—Garlock Packing Company.

Check 3521 opposite last page.

Corrosion-resistant valves are available in variety of metals and alloys and in different models for various applications. They are depicted in Valves Bul—The Wm. Powell Company.

Check 3522 opposite last page.

Non-lubricated plug valves for handling of corrosives are available in Durimet-20, 316 stainless steel Monel, Chlorimet-2, Chlorimet-3 and nickle. They are considered in Bul V/4b—The Duriron Company, Inc.

Check 3523 opposite last page.

Plug gate valves are available in stainless-steel Types 18-8S, 18-SMO and Aloyco 20. Valves have outside stem threads away from corrosive area to prevent galling. They are further described in Plug Gate Valve Bul—Alloy Steel Products Company.

Check 3524 opposite last page.

Fluids Handling

Flexible rubber pipe is made in types to withstand pressures to 250 psi. It is considered in Bul 7152—Manhattan Rubber Division, Raybestos-Manhattan, Inc.

Check 3525 opposite last page.

Pump cups are available in 100% Nylon composition. They are explained in Bul 5903—Darling Valve & Manufacturing Co.

Check 3526 opposite last page.

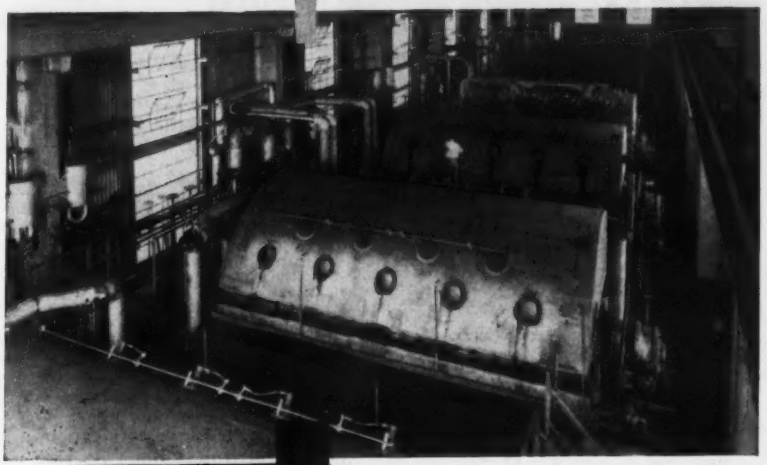
Couplings and fittings for joining of plain-end pipe are discussed in Couplings and Fittings Bul—Victaulic Company of America.

Check 3527 opposite last page.

Spray nozzles of full-cone, hollow-cone and flat-spray types are included in Sprayco Nozzles Cat—Spray Engineering Co.

Check 3528 opposite last page.

the problem: low oil content quality wax on a HIGH PRODUCTION BASIS



ROTARY DRUM FILTERS HANDLE THE JOB... EFFICIENTLY!

High efficiency is obtained with this G-B filter system for Mobil Oil Company at its Beaumont, Texas Refinery. These units feature a self-contained variable speed drive, efficient modern lighting and sight glasses, 2" and 3" FOAMGLAS insulation for low temperature operation. Fine quality parrafin wax of low oil content is obtained on a high production basis.

G-B filters are customed designed to meet your specific need. Write for more detailed information.

See our insert in Refinery Catalog and CEC.

GOSLIN-BIRMINGHAM
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P. O. BOX 631 BIRMINGHAM, ALABAMA
FILTERS • EVAPORATORS • PROCESS EQUIPMENT • CONTRACT MANUFACTURING including HEAVY CASTINGS

Check 3529 opposite last page.

NEW ALL-JACKETED Gate Valve with Replaceable Seats

Valves in line size 1½" through 4" available in cast iron, steel, bronze, Ni-Resist and stainless steel.

Valves in line size 6" through 12" are made of fabricated steel or stainless steel.

● The H&B "all-jacketed" gate valve does not need to be removed from the process line to re-machine the seats. Replacement inserts can be installed in a matter of minutes, minimizing shut-down time . . . Also jacketed pipe, fittings, plug cocks, pumps, meters, flexible hose. Write for Catalog J-50.

HETHERINGTON & BERNER INC. • *Engineers, Manufacturers*

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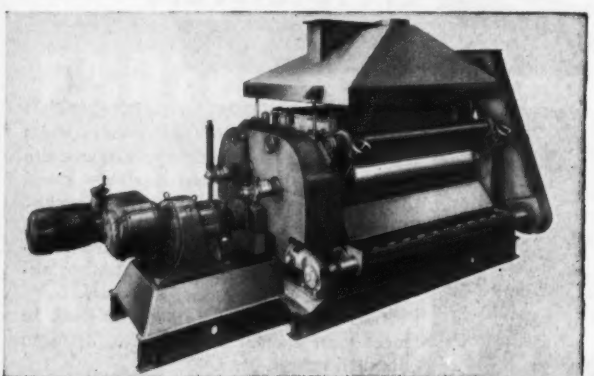
Check 3530 opposite last page.



DAVENPORT Atmospheric Double Drum Dryer

Model 2-28-60 with several special features for drying a chemical compound. Drums are chrome plated and all other parts coming in contact with vapors or product are fabricated from stainless steel. Variable speed drive provides drum speeds of 1½ to 10 R.P.M.

Let our engineers consult with you on your Pressing, Drying and Cooling problems or send for our catalog C. For quick reference consult your Chemical Engineering Catalog.

DAVENPORT MACHINE AND Foundry Company
Davenport, Iowa, U.S.A.

DAVENPORT

PRESSING – DRYING and COOLING Equipment

Continuous DeWatering Presses

ROTARY DRYERS Steam Tube, Hot Air and Direct Fire

Atmospheric DRUM DRYERS

ROTARY COOLERS Water and Air

Check 3531 opposite last page.

CURRENT LITERATURE

Teflon packings of square-braided type are available in all standard sizes of 1/16" increments from ⅛ to ¾" square, in spool or coil forms. Packings are detailed in Bul CP-552—Chemical & Power Products, Inc.

Check 3532 opposite last page.

Valved couplings are available with two- or one-way automatic line shut-off. Available in variety of materials, they are subject of Cat 58—Snap-Tite.

Check 3533 opposite last page.

Impulse steam traps incorporate renewable seat and disc which can be replaced without removal of trap from line. They are tabulated in Steam Traps Bul—Yarnall-Waring Company.

Check 3534 opposite last page.

Asbestos pipe insulation is available in full range of standard pipe sizes and in block form. It is depicted in Bul 65610—Fibrous Products Division, Union Asbestos and Rubber Company.

Check 3535 opposite last page.

Stainless pipe unions incorporate fully designed Teflon seals. Unions have pressure ratings of 2000 to 6000 psi and are further detailed in Koncentrik® Pipe Union Cat—The Special Screw Products Company.

Check 3536 opposite last page.

Pumps in which material moves in contact only with Tygon tube, are available in capacities of 0.5 cc/min to 4.5 gpm. They are considered in Pump Bul—Sigmamotor, Inc.

Check 3537 opposite last page.

Tube, in which wall tolerances can be held to ±0.0005" and diameters to ±0.0002" depending on sizes, are expanded upon in Flo-Rol Tube Bul—Damascus Tube Company.

Check 3538 opposite last page.

Packaging

Stainless-steel drums of 55-gal type are also available in Monel, Inconel or nickel. They are reviewed in Stainless-steel Drums Cat—Pressed Steel Tank Company.

Check 3539 opposite last page.

Gravity operated bag packer which is fully automatic utilizes even-balance scale principle. It is reviewed in Rotomatic Bag Packer Bul—Raymond Bag Corporation, Division of Albemarle Paper Mfg. Co.

Check 3540 opposite last page.

Steel containers, in sizes of 1 through 55 gal, in variety of closures, styles and linings, are tabulated in Steel Containers Bul—Vulcan Containers Inc.

Check 3541 opposite last page.

Drying and Heating

Ovens and dryers, in batch and conveyor types for service to 1000°F, are pictured in Bul 157—Young Brothers Co.

Check 3542 opposite last page.

Dryers of single-shell (471), double-shell (472) and steam-tube (473) types are considered in Buls AH-471, AH-472 and AH-473—Hardinge Company, Incorporated.

Check 3543 opposite last page.

Heaters of all types, including heat exchangers, electric-duct heaters, electric air preheaters and electric strip heaters, are tabulated in Cat 60—Edwin L. Wiegand Company.

Check 3544 opposite last page.

Hand-firing valves, of oil and steam types in both bronze and steel, are reviewed in Bul 90—National Airoil Burner Co., Inc.

Check 3545 opposite last page.

Conveyor dryers of perforated apron type are reviewed in Apron Conveyor Dryers Bul—The National Drying Machinery Co.

Check 3546 opposite last page.

Automatic packaged firing units, of steam-atomizing type for oil and/or gas fuels, are topic of four-page Bul 28—National Airoil Burner Co., Inc.

Check 3547 opposite last page.

Heating mantles in variety of designs and shapes are considered in Heating Mantles Bul—Glas-Col Apparatus Company.

Check 3548 opposite last page.

Humidity-control installations are subject of Drying Data Sheets—Pittsburgh Lectrodryer Division, McGraw-Edison Company.

Check 3549 opposite last page.

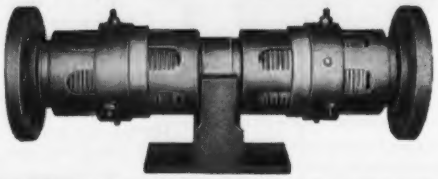
Heat-exchanger design is topic of discussion in Heat-exchanger Design Bul—Downington Iron Works, Inc., Division of Pressed Steel Tank Company.

Check 3550 opposite last page.

Fuel-oil pumping and heating units come in both single and duplex models for 2 to 100 gpm. They are discussed in 16-page Bul 40—National Airoil Burner Co., Inc.

Check 3551 opposite last page.

KEFLEX LAMINATED MULTI-PLY EXPANSION JOINTS of STAINLESS STEEL



PATENT PENDING

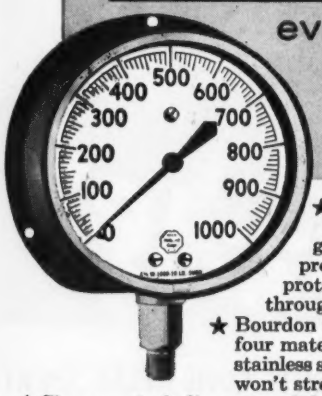
KEFLEX-KETROL cage constructed expansion joints provide internal and/or external torque control and wall protection for bellows in high temperature and high pressure service. See Our Catalog in Sweet's Files.

Write for Catalog on Complete Line.

KEFLEX MANUFACTURING DIVISION
of U. S. FLEXIBLE METALLIC TUBING CO.
HEAD OFFICE – 63 MAIN ST., SAN FRANCISCO
FACTORY – LOS ANGELES, CALIF.

Check 3552 opposite last page.

Helicoid Gages give ***Sustained Accuracy,*** even on the toughest jobs



★ Exclusive Helicoid movement has no gears, no teeth. Shock-proof construction protects accuracy through millions of cycles.
★ Bourdon tubes available in four materials—bronze, steel, stainless steel, and K Monel—won't stretch, crack, or leak.
★ Six cases, including new solid-front safety case, meet every mounting requirement.
★ External pointer adjustment can't be jarred out of position.
★ A complete selection of gages and accessories for hydraulic, chemical, and other service.

Write for Catalog DH-65.

HELICOID GAGES
Helicoid Gage Division
American Chain & Cable Company, Inc.
929-P Connecticut Avenue • Bridgeport 2, Conn.

Check 3553 opposite last page.

CURRENT LITERATURE

Heat-exchanger specifications are reviewed in Bul 949—Pfaudler Division, Pfaudler Permutit Inc.

Check 3554 opposite last page.

Drying is discussed in Drying Bul Proctor & Schwartz, Inc.

Check 3555 opposite last page.

Rotary kilns are explained in Bul 1115—Traylor Engineering & Manufacturing, Division of Fuller Company.

Check 3556 opposite last page.

Universal register units have capacities of 60 to 500 gph. Data on these products are offered in four-page Bul 51A—National Airoil Burner Co., Inc.

Check 3557 opposite last page.

Dual-stage oil burners (25) and steam-atomizing type (21) are considered in four-page and 16-page Buls 25 and 21—National Airoil Burner Co., Inc.

Check 3558 opposite last page.

Processing Equipment

Processing equipment of various types, including towers and trays, heat exchangers, evaporators, extractors, pressure vessels and pilot plants, are considered in 20-page pamphlet which also includes information on manufacturing facilities. "Vulcan Columns"—Vulcan Manufacturing.

Check 3559 opposite last page.

Ribbon blenders in capacities of 7-½ to 3850 gal are explained in Bul 800—The J. H. Day Company, Division of The Cleveland Automatic Machine Co.

Check 3560 opposite last page.

Dust collectors of self-cleaning type are specified in Cat 104—The W. W. Sly Manufacturing Co.

Check 3561 opposite last page.

Dust- and fume-control systems are outlined in 48-page bulletin which pictures specific applications in various industries. Bul PE1-2—The Kirk & Blum Manufacturing Co.

Check 3562 opposite last page.

Dust collector of reverse-jet fabric type has 10,000-cfm capacity. It is depicted in Bul 279C—American Air Filter Company, Inc.

Check 3563 opposite last page.

Packaged pilot systems for study of reaction processes are considered in Votator Pilot Systems Bul—Girdler Process Equipment Division, Chemetron Corporation.

Check 3564 opposite last page.

EXPANDED TEFLON TUBING THAT SHRINKS TO FORM A TIGHT FIT!

IT IS USED:
To encase irregular shapes
To protect electrical components
To obtain tight fits over rollers and machined parts
To join chemical tubes and metal fittings, etc.

PF Teflon-TFE tubing, which has been expanded mechanically, will recover the original dimensions promptly and clamp tightly to the inserted object when heat is applied. This new PF tubing:

- retains the outstanding electrical, mechanical and chemical properties of Teflon
- is available in all popular sizes, in both thin and standard walls, in 11 basic colors, printed and cut to the lengths you require
- can be made cementable

This new Teflon tubing will fit your critical requirements. Get complete details today. Write, wire or call.

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COPPUS "Blue Ribbon" Ventilator-Exhausters are portable and easily adaptable . . . for exhausting welding fumes or foul air from enclosed vessels. Mail coupon below for facts.

COPPUS ENGINEERING CORP.
387 Park Avenue, Worcester 10, Mass.

☐ in tanks, tank cars
☐ in underground manholes
☐ for exhausting welding fumes
☐ on boiler repair jobs
☐ for general man cooling
☐ to stir up stagnant air wherever men are working or material is drying

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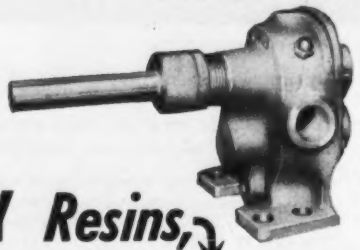
COPPUS BLOWERS

Check 3566 opposite last page.

Pump
CORROSIVE *Liquids*
STAINLESS STEEL



Pump
EPOXY *Resins*
epoxy resin base glues, heavy viscosity liquids
NICKEL ALLOY

Both pumps have replaceable Teflon bearings. Up to 100 psi. Self-priming—positive displacement. Being used successfully by leading chemical companies. Write for literature.

LOBEE PUMP & MACHINERY CO.
Gasport, N. Y.
Since 1899 . . . Noted for Highest Quality Gear Pumps

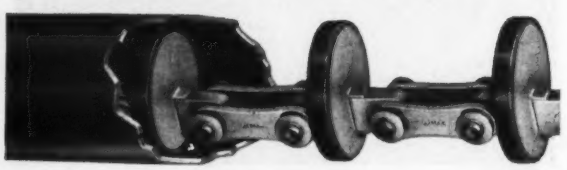
Check 3567 opposite last page.

Hapman Conveyors

offer you these outstanding features for your flowable material:

• Completely flexible • Compact • Self-cleaning
• Self-supporting • Self-feeding • Dust, odor-tight

almost always



cost more

. . . but return their cost many times. Sound engineering, superior materials and workmanship go into every Hapman installation. With Hapman tubular conveyors you have minimum wear, minimum degradation, and maximum trouble-free performance. This is why you may pay more initially, but with Hapman you can be sure of the best conveying system . . . and save in the long run.

For Fact-Finding Report on Hapman Conveyors, write today to:
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Conveyor Division
HAPMAN CORPORATION
630 Gibson St. • Kalamazoo 6, Mich.

Check 3568 opposite last page.

CURRENT LITERATURE

Processing equipment of all types is tabulated in "First Facts"—The Falcon Manufacturing Division, First Machinery Corp., Inc.

Check 3569 opposite last page.

Portable drum rotators which can handle 30- and 55-gal drums and 1- and 5-gal containers with special attachments, are available in capacities to 500 lb. Rotators are depicted in Drum Rotator Cat—Morse Manufacturing Co., Inc.

Check 3570 opposite last page.

Scrubbers for wet-dust collection are delineated in Bul 7460—The Ducon Company Inc.

Check 3571 opposite last page.

Ion-exchange equipment is reviewed in Ion Exchange Bul—Illinois Water Treatment Co.

Check 3572 opposite last page.

Tower packing comes up for discussion in Tellerettes Booklet—The Harshaw Chemical Co.

Check 3573 opposite last page.

Sheet and plate fabrication parts and assemblies are pictured in 36-page bulletin which shows various manufacturing facilities in addition to different products made. Bul F4—The Kirk & Blum Manufacturing Co.

Check 3574 opposite last page.

Vapor condensers are produced in standard units and in range of capacities to 30 million Btu. They are detailed in Bul 129-R—Niagara Blower Company.

Check 3575 opposite last page.

Chemical Methods

Caustic soda, sodium chlorate and chlorine are subject of Caustic Soda, Sodium Chlorate and Chlorine Buls—Hooker Chemical Corporation.

Check 3576 opposite last page.

Dimethyl-naphthalenes, methylnaphthalenes alkyl pyridines, and pyridine carboxylic acids are among chemical materials incorporated in Chemical Index—Reilly Tar & Chemical Corporation.

Check 3577 opposite last page.

Solvents, couplers and diluents, as well as number of plasticizers, are listed in bulletin which gives evaporation rates, viscosities, flash points, blush resistance and other data in tabular form. Total of 69 items are referenced in "Solvent Selector"—Union Carbide Chemicals Company, Division of Union Carbide Corporation.

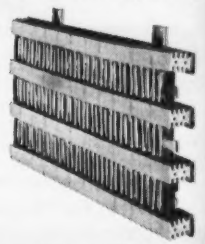
Check 3578 opposite last page.

REDUCE HEATING PROCESS COSTS

THE HEATING ELEMENT MAKES THE DIFFERENCE!
Continuous "Folded and Formed" ribbon type element gives up to 4 times more radiating area per given cross section than any other type—assures more uniform heat at lower cost! Let TRENT ENGINEERS study your needs and determine the type of oven best suited for your use.

ONLY TRENT CUBIC OVEN DESIGN offers quality features at lowest cost
- Controlled Temperatures to 1200°F.
- Forced Air Re-circulation—Direct or Indirect Drive Fan
- Mineral or Glass Wool Insulation
- Steel Inner and Outer Casing
- Hinged Door with Explosion Release Latch
- 1 to 96 cubic foot Size Range
- Wide Selection of Optional Features
- TRENT "Folded and Formed" Electric Heating Element

WRITE FOR BULLETIN 71-TO



TREN INC.
Electrically Heated Industrial Equipment
235 Leverington Ave., Philadelphia 27, Pa.
In Canada
Pioneer Electric Eastern Ltd., Toronto

Check 3579 opposite last page.

FULL CONE—HOLLOW CONE—FLAT SPRAY

Spraco has the most complete line of nozzles available anywhere — **IN STOCK.** Capacities range from ⅛ pint/min. to 4000 gal./min. Bronze, cast iron, and stainless steel. Write for our nozzle catalog.

SPRAY ENGINEERING CO., 105 Cambridge St., Burlington, Mass.

Check 3580 opposite last page.

CURRENT LITERATURE

Luperox 2,5 dimethyl hexane/2,5 dihydro peroxide is solid non-volatile high-temperature hydroperoxide polymerization catalyst. It is specified in Luperox Data Sheet—Lucidol Division, Wallace & Tiernan Incorporated.

Check 3581 opposite last page.

Benzotrifluoride derivatives in research quantities are tabulated in Price List 60-55 (item 1) Maumee Chemical Co.

Check 3582 opposite last page.

Butynediol physical properties, storage and handling instructions and chemical reactions are tabulated in Butynediol Bul—Antara Chemicals, Sales Division of General Aniline & Film Corporation.

Check 3583 opposite last page.

Hydrogen-peroxide four-fold engineering-service program is outlined in Hydrogen Peroxide Bul—Becco Chemical Division, Food Machinery & Chemical Corp.

Check 3584 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Cold-caustic-bleach-process technique permits bleaching in same equipment regularly used for manufacture of cold-caustic pulp. Information on this system is detailed in Cold Caustic Bleach Process Bul—Becco Chemical Division, Food Machinery & Chemical Corporation.

Check 3585 opposite last page.

Boron-trifluoride properties and typical uses are listed in Boron Trifluoride Tech Data—General Chemical Division, Allied Chemical Corporation.

Check 3586 opposite last page.

Propylene-glycol characteristics are tabulated in Propylene Glycol Tech Data—Celanese Chemical Company, Division of Celanese Corporation of America.

Check 3587 opposite last page.

List of patents available on use of hydrogen peroxide and peroxygen and persulfate chemicals is available from Becco Chemical Div., Food Machinery & Chemical Corp.

Check 3588 opposite last page.

Cyclohexanone application details are reviewed in 32-page bulletin containing properties, reactions, and list of 148 literature references. Tech Bul 1-198—National Aniline Division, Allied Chemical.

Check 3589 opposite last page.

CORROSION DATA

20 Selected Results from Service and Laboratory Tests Comparing Ni-Resist with Cast Iron under 400 Different Conditions. Data on comparative service of Ni-Resist in the other corrosive environments may be obtained in the booklet offered below.

Corrosive Medium	Location of Test Specimens	Duration of Test	Temperature °F	Aeration	Velocity	Average Corr. Rates i.p.y. Cast Iron	Ni-Resist**	Type Ni-Resist Preferred
Acetone, 5 parts, and one part Oleic Acid—Linoleic Acid mixture	Separator Tank	131 days	35.6-102 dys. 68.0-150 hrs.	None	None	0.0004	0.00006	1-2
Ammonia, 5-6% by vol.; 150 p.p.m.; Phenol carried by water vapor	Top of phenol tower	309 days	215.6	None	750,000 cu. ft./hr.	0.002	0.0009	1-2
Ammonium, Saturated Sulfate in 3-10% H_2SO_4, plus coke oven gas	Saturator on "Cracker Pipe"	77 days	131	None	Violent	0.08	0.002	1
Calcium Hydroxide (Lime Water)	Laboratory		60	Some	None	0.003	0.0002	1-2
Carbon Dioxide, saturated aqueous solution	Laboratory		60	Some		0.03	0.001	1-2
Coal Tar (High Chloride Content)	Fractionating Column Top Middle Bottom	 154 days 154 days 154 days	 390 515 550	 None None None	 Some Some Some	 >0.2 0.013 0.006	 0.006 0.001 0.003	 3 3 3
Fertilizer, Commercial "5-10-5" Chemical Fertilizer	In contact with damp granules in storage	290 days	ATM	Some	None	0.010	0.003	1-2
Gasoline (end point containing H_2S & mercaptans plus H_2O. 11-13% chrome steel trays badly corroded)	On top of 24th tray of tower	70 days	370-432	None	Some		0.0027	
Hydrochloric Acid 2%	Laboratory		68			0.88	0.005	1
Paper pulp with small amounts of SO_2, Cl_2, H_2SO_4, pH 4-4.5	Decker effluent	198 days				0.006	0.002	1-2
Petroleum: Crude Oil (reduced, containing 0.584% S)	Bottom of crude tower	290 days	500	None	Turbulent		0.0033	1
Petroleum: Crude Oil (sour, cracked, 0.106% H_2S, & 0.066% mercaptan S)	Top tray or reflux tray of tower	132 days	342-352	None	Gas 26g/m		0.0028	1-2
Sodium Chloride	Salt Brine tank	180 days	50	Considerable	Some	0.010	0.003	1
Sodium Hydroxide 30% plus heavy concentration of suspended salt	Salt tank	82 days	180	Moderate	Moderate	0.0063	0.0001	4
Sodium Phenolate, with 20% (by vol.) tar acids. Total alkalinity of 20% by wt. NaOH	In phenol tower	329 days	248	None		0.002	0.0007	2
Steam condensate with dissolved O and CO_2	In condensate return line	30 days	180	Good	By flow	0.002	0.0004	1-2
Steam	In a nipple expanded pipeline from high pressure steam line	31 days	350	Good	120 lb.	0.002	0.0007	2
Water, brackish, East River, N. Y. C.	Water box of Steam Power Plant	334 days	54	Yes	High	0.010	0.002	1
Water, salt, from oil wells	In salt water pit	217 days	60	Slight	By flow	0.02	0.001	1-2
Water, sea	Intake flume	740 days	ATM	Considerable	5 ft./sec.	0.050	0.002	2

**Consult with Inco for specific corrosion rates for the various types of Ni-Resist.

How Ni-Resist irons "rate" against 20 corrosives

Also possessing excellent mechanical properties, corrosion-resisting Ni-Resist can be specified for a broad range of applications for the toughest service conditions

If you're looking for more satisfactory service life from your fluid handling equipment, you may be surprised by the economies that Ni-Resist* irons have to offer.

That's because Ni-Resist irons — with their Nickel content and austenitic matrix —deliver a unique combination of engineering properties:

They resist corrosion and erosion — they stand up to thermal shock—they have great strength and toughness—they resist metal-to-metal wear.

The unique properties of Ni-Resist irons are cast easily into compressors and blowers, filter drums, kettles and pipe. Ni-Resist irons prolong the life of pump casings, liners, wear rings and impellers. Boost the performance of valves and valve trim components.

In all these applications, Ni-Resist irons deliver the much needed corrosion resistance and mechanical properties. What's more, they *deliver them with cast-metal-economy.*

If the specific media in which you are interested are not given in this list of 20, you can obtain more complete corrosion data by writing us for a copy of "Engineering Properties and Applications of Ni-Resist." A postcard will do it. *Inco Trademark

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street INCO New York 5, N. Y.

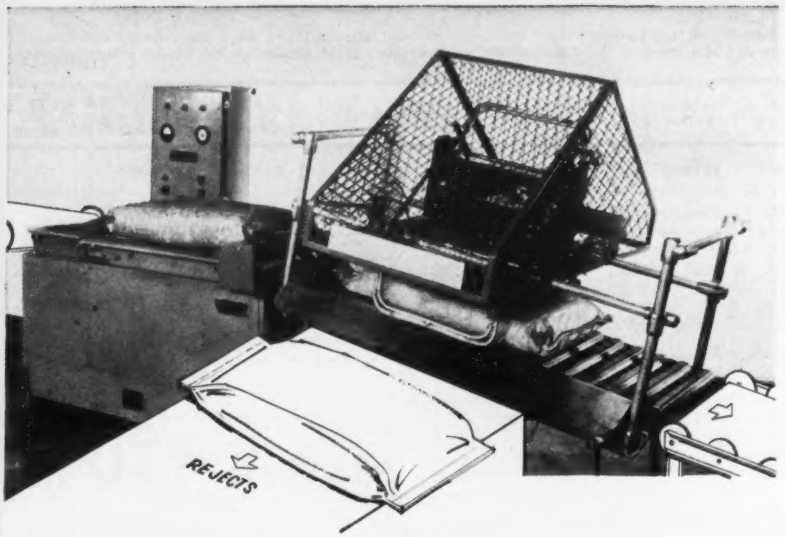
Mechanical and Physical Properties of Ni-Resist

	TYPE 1	TYPE 2
Tensile Strength (thousand psi)	25-30	25-30
Thermal Expansion (70-400°F) (millionths per °F)	10.7	10.4
(millionths per °C)	19.3	18.7
Magnetic Response	Non-Magnetic	Non-Magnetic
Modulus of Elasticity (million psi) (at 25% of Tensile Strength)	12-14	15-16.2
Hardness, Brinell: low chromium	130-170	125-170
high chromium	140-190	140-190
Toughness (Izod Impact Test) (foot-pounds) 1.2 arbitration bar unnotched—struck 3" above supports.	100	100
Machinability	Good	Good

NI-RESIST

NICKEL MAKES IRONS PERFORM BETTER LONGER

Check 3590 opposite last page.



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...with rate of speed at twenty 50-pound bags per minute...

Model 1250 Selectrol, designed for installation in a production line, checkweighs bags from 25 to 150 pounds in motion... and detects weight variations as small as 1½ ounces or less per 100 pounds. Speed is variable — up to 25 bags per minute, depending on size and weight. Tolerance is adjustable to your requirements.

The Selectrol shown above has automatic overweight and underweight rejection mechanism. Models are available with underweight rejection only or without rejection mechanism. All electrical parts are fully protected against dust and oil.

Optional equipment includes: recorders, counters, visual and audible signaling devices and special control accessories to your requirements.

Selectrols are made by Exact Weight, a leading manufacturer of job-engineered scales for 45 years with experience gained through hundreds of checkweighing installations.

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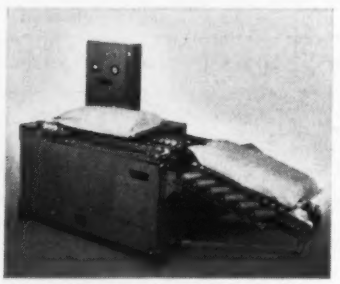
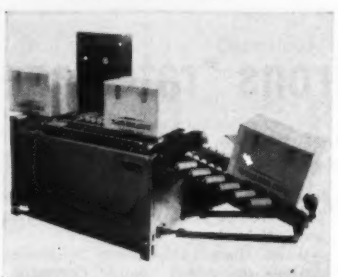


Selectrol Bag Checkweigher shown above without rejector mechanism



Selectrol Case and Carton Checkweigher with rejector mechanism. Acceptable weights continue in a straight line; over and under weight cartons are diverted off the line.

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Check 3591 opposite last page.

Plant Engineering and Maintenance

Compressors, in which cylinder and crankcase are completely separated, are explained in Buls VE-100 and VE-102—Corken's Incorporated.

Check 3592 opposite last page.

Wire cloth in all weaves, metals and weights, is available in rolls or cut to size for variety of applications. It is presented in Bul F-C—Newark Wire Cloth Company.

Check 3593 opposite last page.

Positive infinitely variable-speed drives are available in eight sizes, 16 standard types and capacities of ½ to 25 hp. Details on this line are incorporated in Book 2274—Link-Belt Company.

Check 3594 opposite last page.

Handling wastes, in form of gases and vapors, clear liquids, slurries and solids, and semi-solids, is subject of Waste-handling Equipment Bul—Yeomans.

Check 3595 opposite last page.

Wind, rain and sleet protection is offered by PVC all-weather gear which is reviewed in Wet-weather Clothing Bul—Jomac Inc.

Check 3596 opposite last page.

Cleaners for condenser and heat-exchanger tube incorporate integral water-feeding attachments with finger-action valves to control cooling-water flow into hollow shafts and drills or brushes. Cleaners are subject of Bul Y-48—Elliott Company.

Check 3597 opposite last page.

Packaged fans for supply and exhaust jobs to 25,000 cfm are adjustable in the field to eight discharge directions. Information on these is incorporated in 36-page Cat 517—Clarage Fan Company.

Check 3598 opposite last page.

Oil reclaimer removes solids, acids, volatile impurities, moisture, solvents and gases by heat-vacuum process. It is reviewed in Oil Reclaimer Bul—The Hilliard Corporation.

Check 3599 opposite last page.

Concrete patch which sets instantly and can be used immediately is reviewed in Instant-Use Brochure —Flexrock Company.

Check 3600 opposite last page.

Hard-surfacing is considered in Spray Welder Cat & Manual 79—Wall Colmonoy Corporation.

Check 3601 opposite last page.

Hydraulic oil filters are subject of Hydraulic Oil Filter Bul—The Hilliard Corporation.

Check 3602 opposite last page.

Torque-wrench formulas, applications and adapter problems are among information included in "Torque Manual"—P. A. Sturtevant Co.

Check 3603 opposite last page.

Air-break starters give 100/150 mva fault protection. They are inventoried in Bul 8130A—EC&M Division, Square D Company.

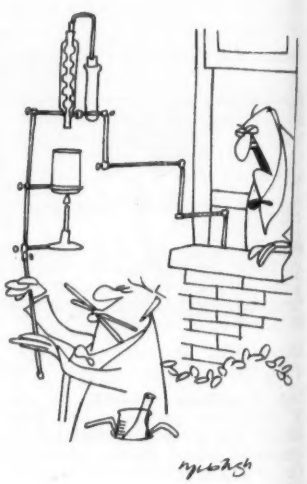
Check 3604 opposite last page.

Steam-driven compressors, of 20 to 1250 hp for discharge pressures of vacuum to 15,000 psig, are tabulated in Steam-driven Compressors Bul—Chicago Pneumatic.

Check 3605 opposite last page.

Citric-acid's role in cleaning stainless-steel equipment is topic of discussion in Bul 102—Chemical Sales Div., Chas. Pfizer & Co., Inc.

Check 3606 opposite last page.



"Don't get carried away, Smith . . ."

CURRENT LITERATURE

Lubrication of heavy duty bearing surfaces continuously and automatically with high-viscosity oils, is possible with units detailed in Thermo-Aire Cat — Stewart-Warner Corporation.

Check 3607 opposite last page.

Force-feed lubricator, which is built for pressures to 6000 psi is among those explained in Lubricators Cat—Manzel, Unit of Houdaille Industries, Inc.

Check 3608 opposite last page.

Wire screen is inventoried in Wire Screen Bul—The W. S. Tyler Company.

Check 3609 opposite last page.

For more information on developments reported in this section, check corresponding numbers on Reader Service Slip opposite last page of this issue.

Wire cloth is made from any metal or alloy including titanium in nine basic weaves. It is inventoried in 102-page Wire Cloth Cat—The Cambridge Wire Cloth Co.

Check 3610 opposite last page.

Rotary pressure joints, for use where inlet or outlet pipe must rotate with roll, are delineated in Bul N-2002—The Johnson Corporation.

Check 3611 opposite last page.

Worm-gear drives are expanded upon in Cat HGB—Foote Bros. Gear and Machine Corporation.

Check 3612 opposite last page.

V-belt drives are considered in HC V-belt Drives Bul—The Gates Rubber Company.

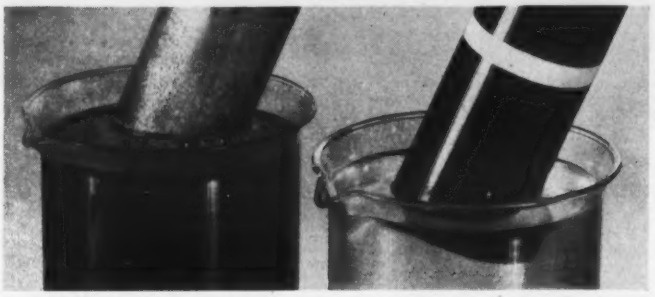
Check 3613 opposite last page.

Joint-leak compound is specified in Leak Lock Bul—Highside Chemicals Incorporated.

Check 3614 opposite last page.

Handy engineering-data tables are contained in eight-page pamphlet, which includes information on weights and specific gravities, engineering constants, steam coils in storage tanks, short-cut engineering conversion factors, steam tables, ampere ratings for induction motors, and torque and horsepower equivalents, among others. Engineering Reference Pamphlet —The Falcon Manufacturing Division, First Machinery Corp., Inc.

Check 3615 opposite last page.



TEST PROVES CORROSION RESISTANCE . . . Stainless Steel 316 pipe (at left) and Fibercast Pipe were tested in 54% P_2O_5 solution at 290° F using modified ASTM A-262-55T formula. The stainless steel pipe showed .778" penetration per month; yet the Fibercast showed no deterioration whatsoever.

New pipes eliminate corrosion problems in processing industries!

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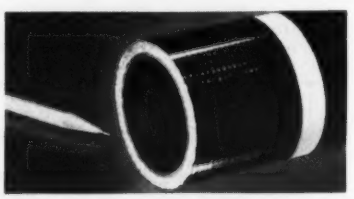


WHAT is Fibercast?

It is centrifugally cast, thermoset, epoxy resin reinforced pipe that handles temperature and pressure problems where no other pipe will do. Its body of woven glass fibers resists high tension forces, is embedded and bonded by heat in epoxy resin. Result: strong, long-lasting pipe that resists high pressures and temperatures in corrosive environments.

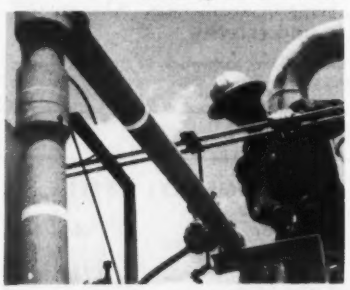
WHEN should Fibercast be used?

Whenever ease of handling, light weight, dielectric properties and structural stability are desirable in a piping material that is at the same time outstandingly resistant to heat, pressure and particularly corrosion.

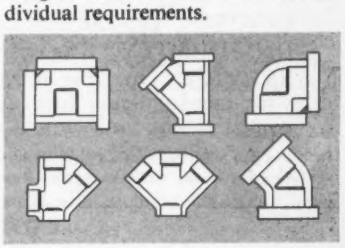
Examples: Petroleum industry . . . chemical . . . petro-chemical . . . nuclear energy . . . textile . . . paper . . . food-processing . . . and countless other operations handling acids, alkalies, salt water and other corrosive liquids under pressure.

WHY use Fibercast?

Fibercast's remarkable lasting qualities . . . its amazing resistance to "impossible" temperature and pressure conditions . . . make it a long-lived, cost-saving, maintenance-saving pipe. Remember, too: Fibercast has the world's most complete stock of standard fittings, as well as couplings designed and made to order for individual requirements.



Workman is shown with section of Fibercast pipe bearing 32% HCl at a Shell chemical plant. Note that Fibercast has sufficient strength for installation on span racks with the spacing normally used for metal pipe.



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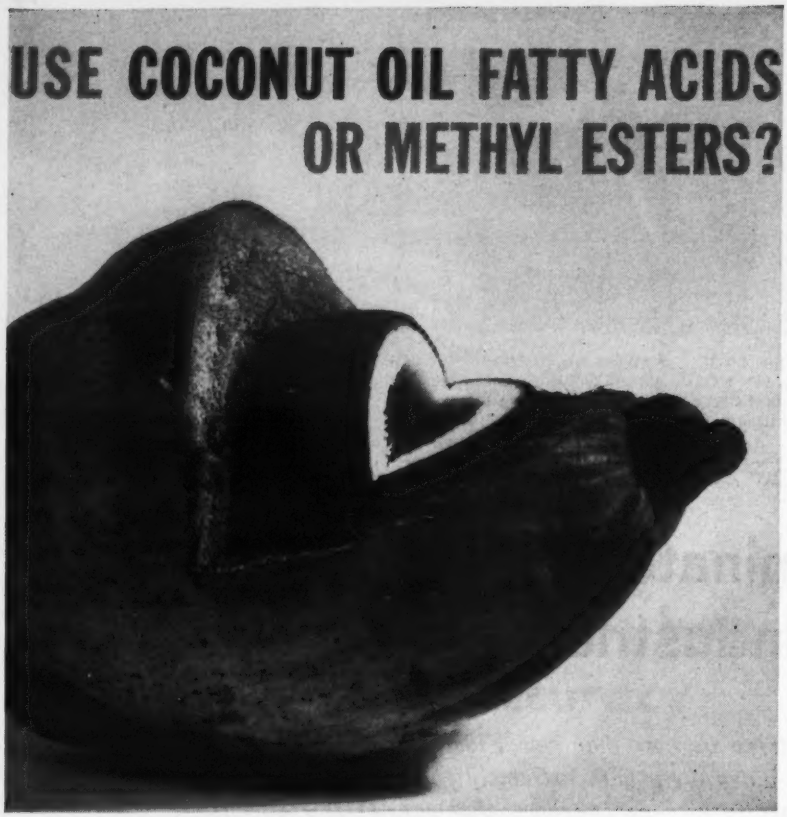
USE COCONUT OIL FATTY ACIDS OR METHYL ESTERS?



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Check 3617 opposite last page.

CURRENT LITERATURE

Engine-driven compressors with 6-, 8- and 10-power cylinders of 2000 to 3500 hp have bore of 18" and stroke of 20". Components of unit are pictured and diagramed in detail in 28-page Bul 86—Cooper-Bessemer Corporation.

Check 3618 opposite last page.

Concrete structural elements are pictured in use in 12-page Bul HMM 2180—Concrete Products Division, American-Marietta Company.

Check 3619 opposite last page.

Weighing

One remote dial serves three platforms in application of electronic-load-cell scale in truck weighing at large cement plant. Full-figure weight data is also printed. Unit is outlined in Bul 2970—Toledo Scale, Division of Toledo Scale Corporation.

Check 3620 opposite last page.

Constant-feed weigh-hopper systems are delineated in Bul 40—Weighing & Control Components, Inc., Division of CompuDyne Corp.

Check 3621 opposite last page.

Automatic batch-weighing systems utilizes as many formulas as required, which can be pre-set on units which are into control panel. System is considered in Bul 2964—Toledo Scale, Division of Toledo Scale Corporation.

Check 3622 opposite last page.

Checkweighers, which can provide continuous 100% in-line check-weighing of items from a few ounces to 200 lb, are explained in Bul 2968—Toledo Scale, Division of Toledo Scale Corporation.

Check 3623 opposite last page.

Sub-surface filler automatically eliminates foaming and controls drum filling. Scale is keyed into conveyorized system in this application. Unit is considered in Bul 9030—Toledo Scale, Division of Toledo Scale Corporation.

Check 3624 opposite last page.

Heavy duty weighing units, including dormant, built-in, portable, bench, counting, overhead-track and printer scales, are subject of 40-page Cat 651—Detecto Scales, Inc.

Check 3625 opposite last page.

Weighing units, for counting, measuring, testing, portioning, grading, compounding and mailing, are described and illustrated in 24-page Cat 556—Detecto Scales, Inc.

Check 3626 opposite last page.

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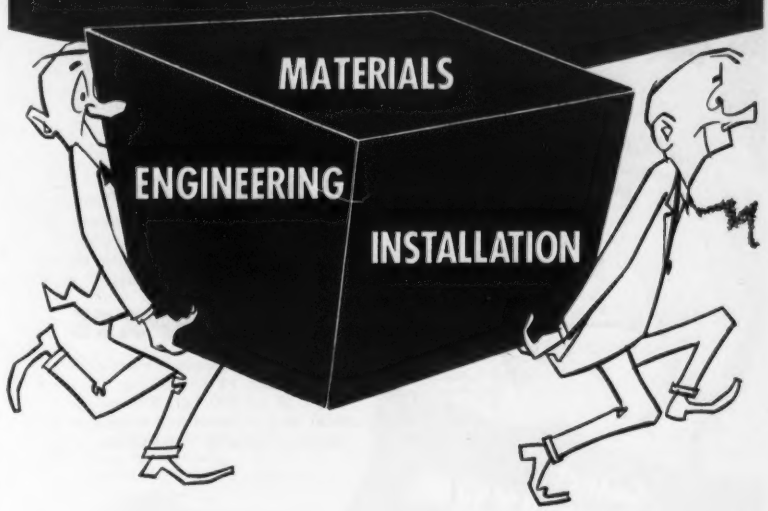

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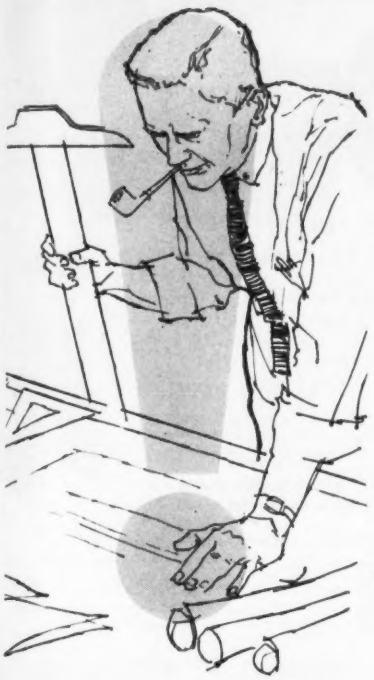

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Extremely complex shapes and forms are routine assignments for these stainless steel specialists. Unbelievably deep draws; smooth, virtually invisible weldments; large or small production runs.

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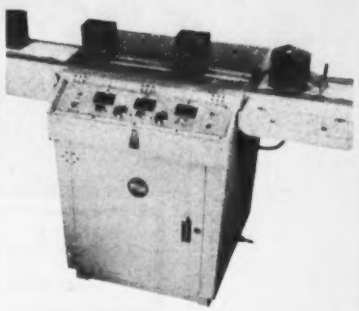

Wrightronic® Checkweigher Provides Automatic 100% Weight Inspection

Here is the sure, automatic answer to tightening Weights & Measures regulations and costly product give-away.

As packaging line equipment, the Wrightronic Checkweigher can be used to reject packages over or under acceptable weights.

As a quality control instrument, the Wrightronic Checkweigher provides exact data on accuracies and makes it easier to spot necessary adjustments to your weighing-filling equipment.

This modestly priced, thoroughly proven checkweigher:

- Electronically gross weighs each package.
- Signals whether package is over, under, or on weight.
- Registers running count in each weight classification.
- Rejects, if desired, any package outside acceptable limits.

Normal operating speed is 100 to 120 per minute, depending upon product and package. Range: 3 ounces to 5 pounds.

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SERIES D-41

316 Stainless Steel Bourdon Tubes

316 stainless steel welded Bourdon tube. ¼" (316) stainless steel pressure connection. Nickel plated mechanism. Outside adjustments. Calibrated dial. Hermetically sealed mercury contact.

Operating ranges: 30" vac.-75 psig; 10-100 psig; 30-400 psig; 75-800 psig. and 100-1000 psig.—with varying differentials and electrical capacity to meet your application.

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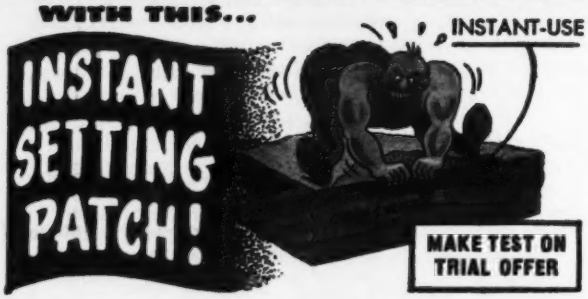

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that's interesting

Thought-provoking slants on projects and products

Body wastes to provide astronaut with water

An astronaut enroute to Mars will be able to drink water extracted from his own body waste, according to J. J. Konikoff and M. H. Bengson of the Space Sciences Laboratory, General Electric Company, Philadelphia, Pa.

One problem in space travel is that a space ship going to Mars or Venus, for example, could not carry all the water its crew would need. The method developed by Bengson and Konikoff would solve that problem.

The water produced in the Space Sciences Laboratory has become so commonplace, that laboratory workers will not bother to go across the hall to the water cooler when any of this uniquely produced water is available. The laboratory-produced water is of a higher quality than ordinary Philadelphia drinking water.

The wastes are distilled by using the vacuum in space and then passed through a high-temperature catalytic zone, heated by solar energy, where bacteria, odors and other toxic materials are destroyed. Up to 95% by weight recovery has been obtained.

Smoke signals cause reaction in brain

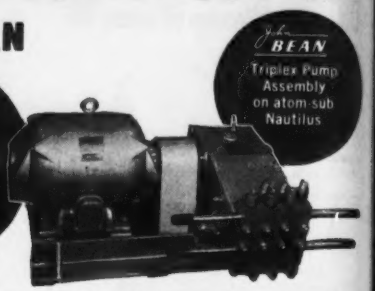
Strong electrical discharges have been recorded in the limbic or "Old Brain" system in reaction to smoke signals transmitted through the olfactory nerves.

The reaction was detected by Dr. Edward F. Domino, University of Michigan medical researcher, who planted delicate electrodes in different portions of the brain to measure activity of cells responding to the sense of smell.

The limbic system is believed to be the seat of the emotions.

for PRESSURES to 12,000 lbs.
TEMPERATURES to 500° F.

John BEAN high pressure pumps



Rugged, compact John Bean Triplex Pumps are the answer for high pressure pumping applications, among them coolant pumping in atomic reactors. Pressures range from 1000 to 12,000 psi, fluid temperatures to 500° F. Important design features include:

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- Distortion-free cast iron housings.
- Free-acting ball-type and spring loaded poppett valves, replaceable valve seats

also: John Bean vertical duplex pumps — pressures to 1000 psi, temperatures to 200° F.

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John BEAN DIVISION OF FOOD MACHINERY & CHEMICAL CORP.
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Chemical Materials Listing

FOR MORE INFORMATION on products in this year's listing of developmental-scale chemical materials (page 96), **TYPE OR PRINT** the key numbers in spaces below

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☐ 3373	☐ 3424	☐ 3475	☐ 3526	☐ 3577	☐ 3628*
☐ 3374*	☐ 3425*	☐ 3476	☐ 3527	☐ 3578	☐ 3629
☐ 3375	☐ 3426	☐ 3477	☐ 3528	☐ 3579	☐ 3630
☐ 3376	☐ 3427*	☐ 3478*	☐ 3529	☐ 3580	☐ 3631
☐ 3377	☐ 3428	☐ 3479	☐ 3530	☐ 3581	☐ 3632
☐ 3378	☐ 3429	☐ 3480	☐ 3531	☐ 3582	☐ 3633
☐ 3379	☐ 3430	☐ 3481	☐ 3532	☐ 3583	☐ 3634
☐ 3380	☐ 3431	☐ 3482	☐ 3533	☐ 3584	☐ 3635
☐ 3381	☐ 3432	☐ 3483	☐ 3534	☐ 3585	☐ 3636
☐ 3382	☐ 3433	☐ 3484	☐ 3535	☐ 3586	
☐ 3383	☐ 3434	☐ 3485	☐ 3536	☐ 3587	
☐ 3384	☐ 3435	☐ 3486	☐ 3537	☐ 3588	
☐ 3385	☐ 3436	☐ 3487*	☐ 3538	☐ 3589	

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(This request form expires October 5, 1960)

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THAT'S INTERESTING

Solar power wasted

Solar batteries could be improved 50% by better fabrication methods, according to Drs. Hans J. Queisser and William Shockley. Present inefficiency of batteries arises from unknown and uncontrolled recombination centers that absorb unnecessarily large fractions of electric current generated by sunlight, they claim.

Research to pinpoint and eliminate these centers is urged in paper presented before the American Physical Society recently.

Algae steak in 2060

In 100 years, a diner in a cafe may tell the waiter, "Give me 500 g of atomic broiled algae—in sirloin form. I had the pork chop form last night." At least that's what General Mills food researchers believe may be in store for man. They see increased use of vegetable proteins made necessary by population increases.

for most durable, chemical-proof floors . . .

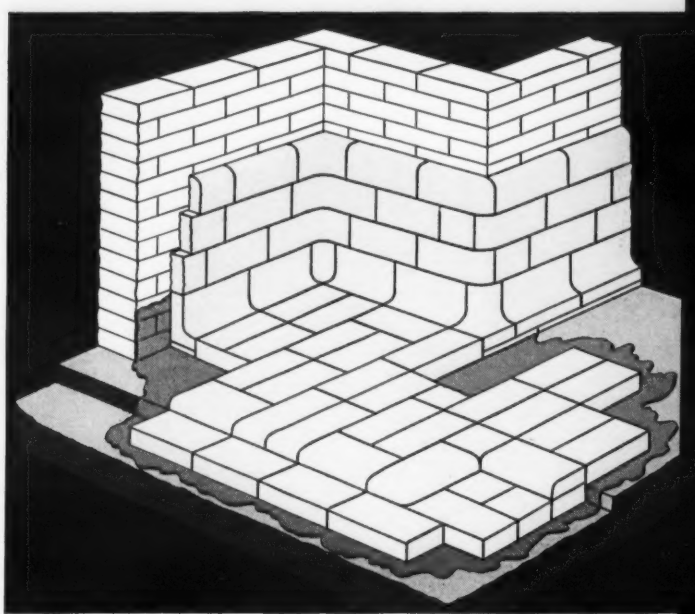
HARBISON-WALKER

DURO ACID-PROOF TILE

Duro tile are dense and non-absorbent throughout their entire thickness and are not dependent upon a skin glaze for resistance to penetration by corrosive liquids. The smooth, non-glassy surface of Duro is good for traction and the avoidance of slippage. Surfaces can be textured if desired.

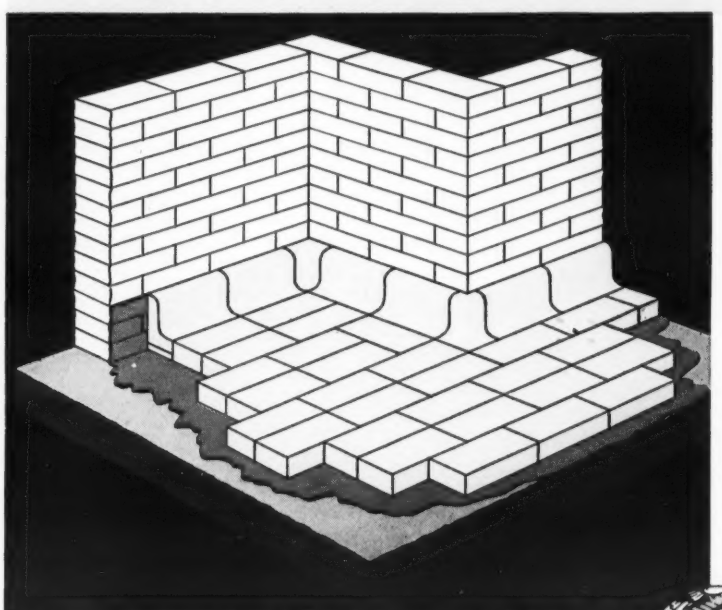
Duro is vitreous to the most desirable degree for high strength to withstand impact and abrasion and for maximum impermeability and resistance to chemical action. This combination of properties is attributable to its stabilized chemical composition of aluminum silicate which is exceedingly low in the more soluble basic fluxes, such as iron oxide and alkalies, the vacuum method of forming and the high temperature at which it is fired. Its mineral constituents are converted to the most stable forms of greatest insolubility in acids and various corrosive materials.

The light buff color of Duro, with freedom from the glare caused by glazed surfaces, contributes to the clean, sanitary appearance of the floors. The excellent workmanship of Duro tile and the variety of cove base shapes makes readily feasible a neat close fitting construction that is easy to keep clean.



SHAPES AND SIZES Depicted here are typical designs of DURO floor tile constructions using Harbison-Walker shapes and standard rectangular sizes as shown.

9" x 4½" x 1¼" ST
9" x 4½" x 1½" ST
9" x 4½" x 2" ST
9" x 4½" x 2½" ST
9" x 4½" x 3" ST
12" x 6" x 1½" ST



Typical applications for Duro floors

Acid Rooms
Chemical Plants
Electroplating Plants
Electrolytic Metal Refineries
Food Processing Plants
Galvanizing Departments
Metal Fabricating Plants
Paper Mills
Rayon Plants
Steel Pickling Plants

Duro brick and shapes are widely used with excellent service in many corrosion-resistant constructions such as • Towers • Tanks • Digesters • Sumps • Concentrators and Stacks.

Write for complete information

World's Most Complete Refractories Service

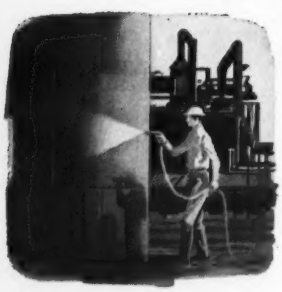
HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
GENERAL OFFICES: PITTSBURGH 22, PENNA.

Check 3635 opposite last page.

AMERCOAT: COMPLETE CORROSION PROTECTION

No one coating is ideal for all applications. A coating which gives outstanding protection against strong alkalies may fail completely when exposed to acids or severe weathering.

In order to provide complete corrosion protection, the Amercoat Corporation manufactures more than 40 completely different products, each formulated to give maximum corrosion protection for specific applications. As new processes and techniques alter exposures and requirements, Amercoat's continuing research develops new products to meet those requirements. Also, advanced research and testing upgrades and improves existing products to maintain maximum protection and enduring, maintenance-free life. Amercoat protective coatings, ranging from vinyls to epoxies to phenolics, are tailor-made for long-range protection and economy in tough applications.



BONDSTRAND—A corrosion resistant, high strength, glass reinforced epoxy pipe.
Typical applications: Acid lines, waste process water, ducting for air or fumes, process lines.

DIMETCOTE—100% inorganic, zinc silicate coating
Typical applications: Tank exteriors, structural steel, cooling towers, and as a permanent primer.

AMERCOAT No. 86—A synthetic resin primer especially formulated for exceptional adhesion and compatibility with various surfaces. Can be overcoated with vinyl or epoxy coatings.

AMERCOAT No. 33—Vinyl maintenance coating unexcelled for water immersion, chemical spillage or corrosive fumes.
Typical applications: Plating tanks, tank car exteriors, structural steel, caustic tanks, tank exteriors.

AMERCOAT No. 66—A high build epoxy for tank lining or exterior maintenance coating.
Typical applications: Brine tanks, structural steel in processing areas.

AMERCOAT No. 78—An easily applied coal tar epoxy which provides exceptional resistance to water and a wide range of chemicals.

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